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ORIGINAL ARTICLES

SUGGESTIONS IN X-RAY TECHNIC FOR THE ORTHODONTIST.

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IT is no longer necessary to advocate the use of the x-ray in any of the various branches of dentistry, as its merits and possibilities are well known. The number of instances in practice where the x-ray proves a valuable adjunct in diagnosis and in checking up the progress of treatment, is on the increase, as children are receiving orthodontic advantages at an earlier age than was customary a few years ago. In most of these cases many of the deciduous teeth are still present, so that intelligent treatment demands radiographic evidence as to their successors, their state of development, etc.

The popular conception of the x-ray laboratory is that it is a "place apart," filled with expensive apparatus in which strange and mysterious things transpire; where the operator presides like some ancient alchemist and directs the mysterious forces which bring about startling results.

As a matter of fact there is nothing about it to justify such a conception. In the first place, it need not be a place apart, but simply an addition to the ordinary operating room of apparatus which is no more expensive than the other requisites of practice such as cabinets, chairs, cuspidors, engines, etc.

The knowledge required for the successful operation of x-ray apparatus, is no more difficult to acquire than is any other knowledge which is worth while, and like such knowledge, it has its reward. In fact, there are few fields of collateral science which offer greater opportunity for help to the dental profession than that awaiting them in the branch of physics of which the x-ray is a part.

The requisities of an x-ray laboratory for the orthodontist are not numerous, but consist of

1st—A so-called x-ray machine (an induction coil or transformer).

2nd—An x-ray tube.

3rd—An adjustable tube stand for holding the tube, which should include a tube shield made preferably of leaded glass, serving as a means of

confining the rays and as a means of protecting the operator, and a lead compression diaphragm and lead lined compression cylinder.

4th—A photographic dark room.

The Arrangement of the Apparatus in the Office.

If such an equipment is contemplated, the question naturally arises, where can the necessary apparatus be placed? While a separate room is desirable, it is by no means necessary, as the ordinary operating room of fair size can be made to accommodate it.

The coil or transformer and tube stand can be placed against the wall

Fig. 1.—A convenient manner of arranging the necessary apparatus when not in use.

at the left side of the room, while the tubes can be hung in a suitable rack upon the wall where they will be out of harm's way. Arranged in this manner, x-ray apparatus is not in the way and is accessible for use at any time. (Fig. 1).

The dental chair with its multitude of adjustments serves an important purpose in the dental x-ray laboratory, for the patient must be able to hold perfectly quiet during the time the exposure is made. Owing to the stability of the chair and its many adjustments, this is not only possible but preferable to having the patient lie upon a table, which has been the method employed by many radiographers, in the past.

THE PHOTOGRAPHIC DARK ROOM.

One of the most important requisites of the dental x-ray laboratory, is the photographic dark room, and any one attempting to do radiography without it is greatly handicapped. It need not be large or elaborate, and running water is not absolutely essential, although it is an advantage. A closet $3\frac{1}{2}$x5 feet will suffice if nothing better is available. A broad shelf should be placed at one end to hold the developing trays and other photographic accessories.

With a dark room always available, the dental radiographer is able to develop his plates or films immediately, profit by their findings, or in case they do not come out satisfactorily, make others without subjecting his patient to the inconvenience of another appointment.

Fig. 2.—The patient may hold the film in place by exerting slight pressure with the thumb.

THE TECHNIC OF DENTAL AND ORAL RADIOGRAPHY.

Having named the requisites of the dental x-ray laboratory, let us now proceed to a consideration of their application in the actual work of radiography.

The very nature of the structures with which we concern ourselves, their gross as well as their minute anatomy, renders them somewhat difficult to radiograph, and necessitates refinement of technic greater than that demanded with the other portions of the human anatomy. It would therefore seem obvious that an accurate knowledge and anatomic appreciation of the structures of the oral cavity and associated organs and structures is the first requisite for successful dental and oral radiography.

In order to obtain a radiograph of any portion of the body, it is necessary to have a photographic or x-ray plate (properly prepared so as to exclude all light and moisture), placed in such a position that the rays passing through the structures desired, will register their shadows with the least amount of distortion possible upon the plate.

In securing shadowgraphic representations of the dental and oral structures, two general methods of procedure are open to us, each of which has its value and special indications. These are known as the "Intra-Oral" and "Extra-Oral" methods.

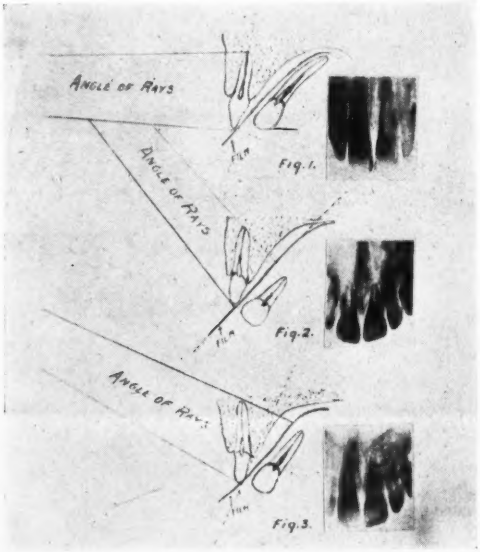


Fig. 3.—Showing the results of correct and incorrect technic.

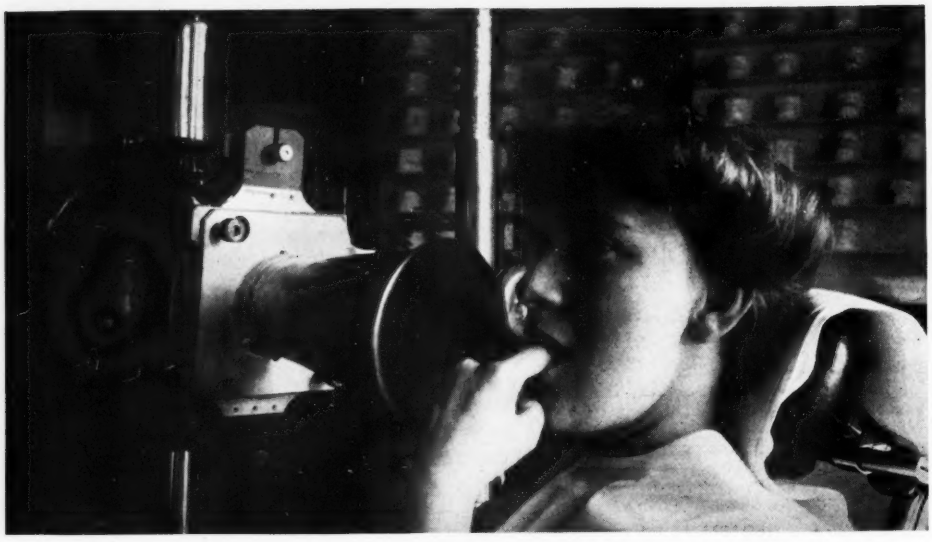


Fig. 4.—The patient holds the film in place against the lower teeth with the finger.

With the first, only small films are used which are placed within the mouth opposite the area to be radiographed, and held in position either by means of a tray or film holder, or by the assistant, or better still, by the patient exerting slight pressure with the finger. This method is indicated where radiographs of *small areas only* are desired, as, for instance, two or three of the upper teeth, with the adjacent alveolar process. It is used to particular advantage in radiographing the area lying between the upper

cuspids, where a high degree of detail is desired. In fact, it can be used in any part of the mouth where small areas only are desired.

With the other method of procedure mentioned, viz., the "Extra-Oral" method, large plates or films are used and the areas desired are brought in as close contact as possible with the plate by pressing or resting the face against it. The x-rays are then passed through the structures from the other side of the skull, so as to pass through the entire face or skull, in transit.

When using this method, large areas may be radiographed which in some instances will embrace the lateral halves of both the upper and lower jaws from the cuspid region anteriorly to the angle of the jaw posteriorly, and from the floor of the orbit above to the inferior margin of the mandible below. In fact, it is possible by making several exposures to obtain in detail a shadowgraphic representation of the dental apparatus "in toto" as well as its associated organs and structures, the nasal cavity and pneumatic sinuses, the maxilla and the mandible.

Fig. 5.—The head rest of the dental chair with its many possible adjustments can easily be placed so that the patient's head rests easily and firmly upon it.

It should be apparent to any one that the first method greatly reduces the possibilities of the x-ray. Both methods have their advantages and neither should be discarded in favor of the other.

THE INTRA-ORAL METHOD.

We will first discuss the Intra-Oral method by which small areas are radiographed. First of all, the patient should be placed in a comfortable position, and the head supported so that it may be held perfectly still. After the tube has been tested out and the proper degree of vacuum established, the tube stand (complete with the other apparatus before described) is moved to a position where the rays coming from the tube, through the compression diaphragm and cylinder, can be made to pass through the desired areas and cast their shadows upon the small plate within the mouth. (Fig. 2.)

In using this method upon the upper teeth, the greatest care must be exercised that the shadows produced are free from distortion, for the film must

be held within the upper arch against the lingual side of the teeth and the palate, and must occupy a position which is in a different plane from that occupied by the roots of the teeth. Whenever it is necessary to direct the rays upon structures which lie at an angle with the plate or film, correct shadows may be obtained by adhering to the following rule: "Bisect the angle made by the plane of the teeth, and the plane of the film, and direct the rays so that they will fall perpendicularly to this bisecting plane."* (Fig. 3.)

Failure to adhere strictly to this rule is one of the most common causes of partial or complete failure in producing true shadowgraphic representa-

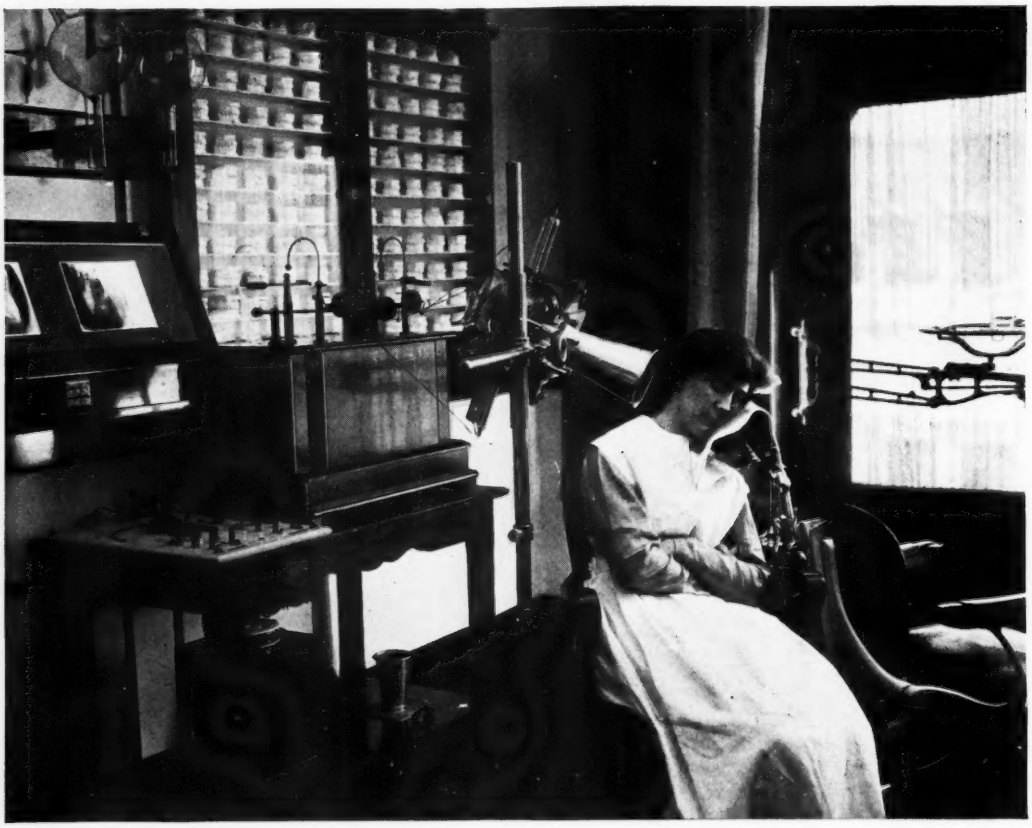


Fig. 6.—It requires but a few movements to arrange the apparatus in this manner. The comfortable position of the patient makes it an easy matter to remain perfectly quiet.

tions of the dental structures. For instance, if the rays are directed from too low a source, the shadows will be lengthened, or if they be directed from too high a source, the shadows will be foreshortened, the amount of elongation or foreshortening being in direct proportion to the amount of deviation from the proper focal point.

In using this method upon the lower teeth, we do not have this difficulty to contend with, as the films can be placed for the most part in such a position that they lie parallel to the long axis of the teeth, and the rays can be directed in a perpendicular direction both to the plane of the teeth and the plane of the film. (Fig. 4.)

*Technic of Dr. Weston Price.

Another point of technic which should not be overlooked if sharp outlines are to be obtained, is the one in regard to having the tube placed at the proper distance from the structures to be radiographed. To establish the best focal distance for work about the teeth or jaws, the target of the tube should be about twenty inches from the plate.

With a good induction coil or transformer, and a properly regulated tube, good radiographs can be obtained by very short exposures, particularly by using the Intra-Oral method, as the rays need only penetrate a comparatively short distance before reaching the plate. With the apparatus now available good radiographs can be obtained by instantaneous exposures.

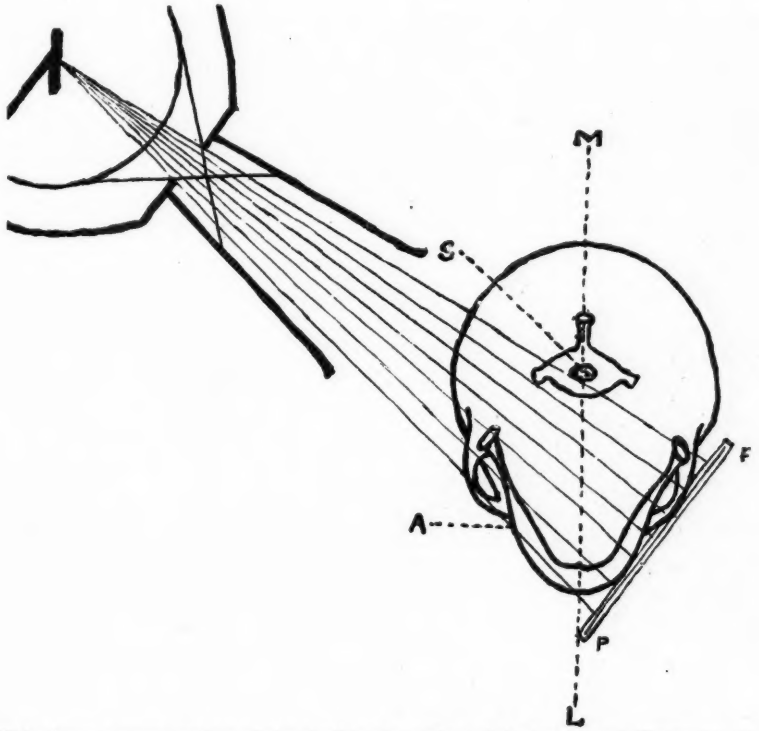


Fig. 7.—This shows a cross-section of the skull in the region of the teeth, and illustrates the manner in which the rays must be directed to get a radiograph of the left side which will include the upper and lower teeth from the cuspid region to the angle of the jaw.

THE EXTRA-ORAL METHOD.

The Extra-Oral method is in my opinion the one offering the widest range of usefulness in our work. As stated previously, this is the method used to obtain radiographs of large areas. Not only can larger areas be obtained by this method, but locations and structures inaccessible to the small films are reached and their images accurately and clearly recorded upon the larger plates. Therefore, the advantage of this method is well founded.

The technic is simple when once mastered, but must be adhered to accurately if the results are to be depended upon for diagnosis. In using the Extra-Oral method, large plates or films are used and the areas desired are brought in as close a contact as possible with the plate by pressing or resting the side or portion of the face upon which the structures desired are located, against the plate. (Fig. 5.)

First of all, the patient must be placed in a position so that the head can be held perfectly still. The dental chair with a few adjustments, offers an excellent means for accomplishing this. One of the chair arms is lowered down against the side of the chair or removed, and the patient placed sideways in the chair. The chair back is adjusted so that the patient lies against it in an easy position, and the head rest wings are adjusted so as to lie flat and thereby form an excellent resting place for the plate. The head rest with its many possible adjustments can easily be placed so that the patient's

Fig. 8.—A radiograph made using the technic as shown in Figs. 6 and 7.

head rests easily and firmly upon the plate, rendering it an easy matter to remain perfectly quiet.

The Author's Method of Seating the Patient.

In the author's opinion, there is another method of seating the patient for this character of work which necessitates less confusion in the office than the method just described. It is accomplished by using an ordinary chair with a straight back and small arms, placed against the back of the dental chair. The head rest of the chair (Fig. 6) is turned over and adjusted to the proper height, position and angle, so that the patient's head can rest against

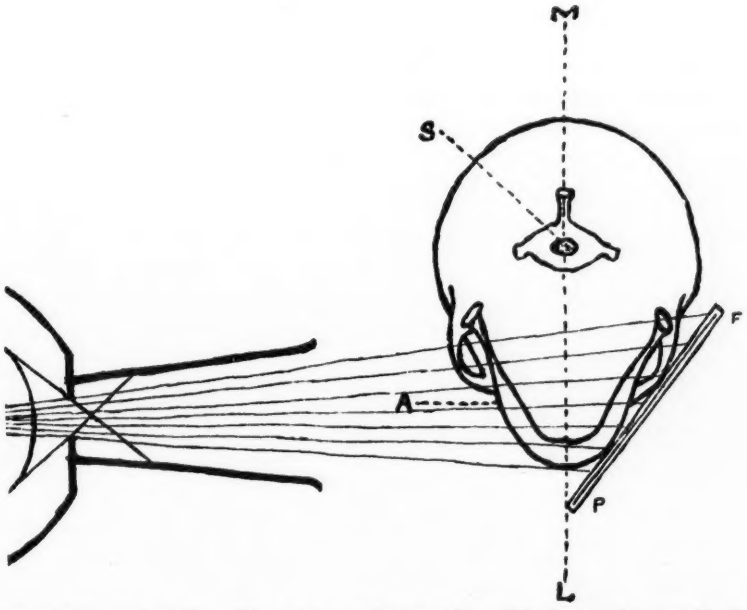


Fig. 9.—Incorrect technic. The shadows of both sides will be imposed upon the plate.

Fig. 10.—The result of poor technic. This is a radiograph of the same subject as shown in Fig. 8.

it in any desired position. In this way the patient is afforded the firm support of the heavy dental chair, and therefore has little difficulty in remaining perfectly quiet, and the operator can, by making a few changes in the position of the small chair, by moving and readjusting the tube stand and the head rest, have access to any part of the dental apparatus.

The fact that this requires but a few moments, does not disarrange the office or put the patient to discomfort, justifies the author in feeling that it is by all means the preferable method for use in the dental office.

With the head thus supported, the rays are directed from the opposite side of the head, and therefore must pass through the entire face or skull in transit. The question naturally arises, how is this to be accomplished

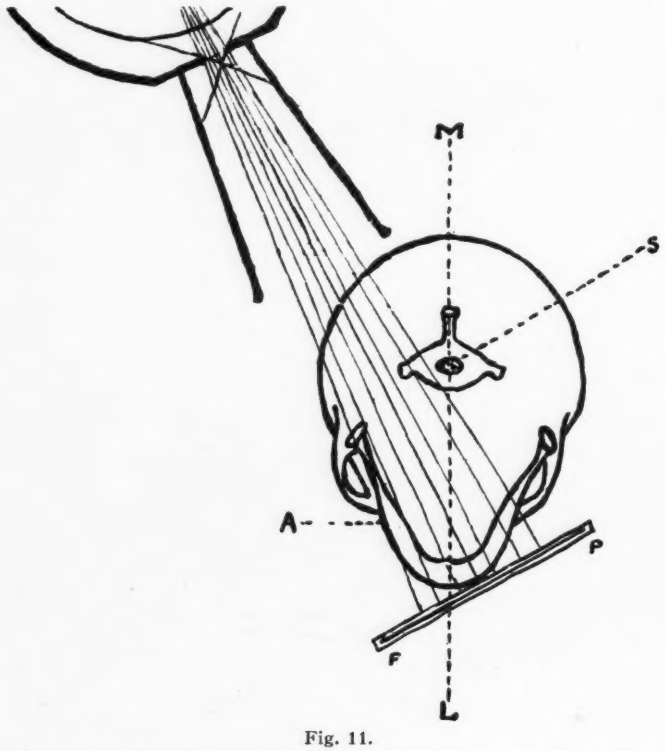


Fig. 11.

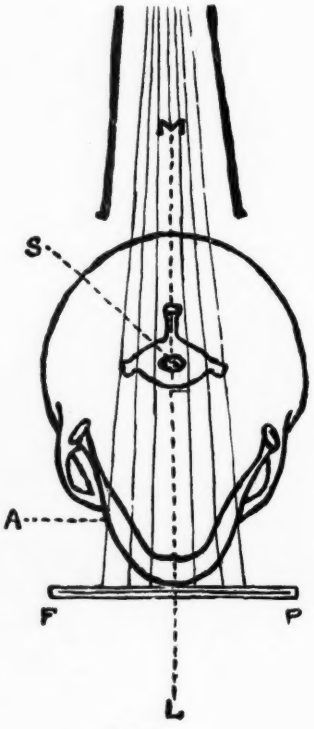


Fig. 12.

Fig. 11.—The areas in the upper and lower jaws extending from the median line to the first premolar can be radiographed by utilizing this technic.

Fig. 12.—The structures at the median line including the incisors, both above and below, may be secured in this way.

without superimposing the shadows of one side upon the shadows of the other side, and thereby producing a chaotic result.

For instance, let us suppose that we wish to obtain a radiograph of the left side of the upper and lower jaws extending from the cuspid region in front to the angle of the jaw behind, and from the floor of the orbit above to the inferior margin of the mandible below. If we are to get a correct shadowgraphic representation of this area, it should be free from the shadows of the opposite side, and this can only be accomplished by directing the rays in such a manner that they will miss the area not desired and will pass through those we wish to record.

In accomplishing this, we must take into consideration two structures,

viz., the spine and the angle of the jaw (on the left side in the instance) and cause the rays to pass in through this opening and thereby reach the desired area. (Fig. 7.)

An important factor in accomplishing this is the position in which the patient's head is held as it is pressed against the plate. Held in the manner shown in Fig. 6, the rays can be directed in between the angle of the jaw and the spine, and can pass in a perpendicular direction to the long axis of the teeth and the plate, giving correct shadow lengths upon the plate. Fig. 8 shows a radiograph made by using this technic.

If this rule be disregarded and the rays passed through the structures,

Fig. 13.—In following the technic, illustrated in Fig. 12, the patient's head should be supported by a bandage of gauze to insure perfect immobility.

as shown in Fig. 9, the shadows of the opposite side will be superimposed upon the structures desired and a chaotic result produced. The result of such technic is shown in Fig. 10.

When ready to make the exposure for such a picture, the apparatus is arranged with the anode of the tube about twenty inches from the plate.

In a similar manner as shown in Fig. 7, with slight adjustments in the position of the plate, the head and the tube, the areas in the upper and lower jaws extending from the median line to the first premolars, and from the nose above to the inferior margin of the mandible below, can be radiographed, (Fig. 11). Likewise the structures at the median line including the incisors, both above and below, the anterior portions of the mandible and maxilla.

Fig. 14.

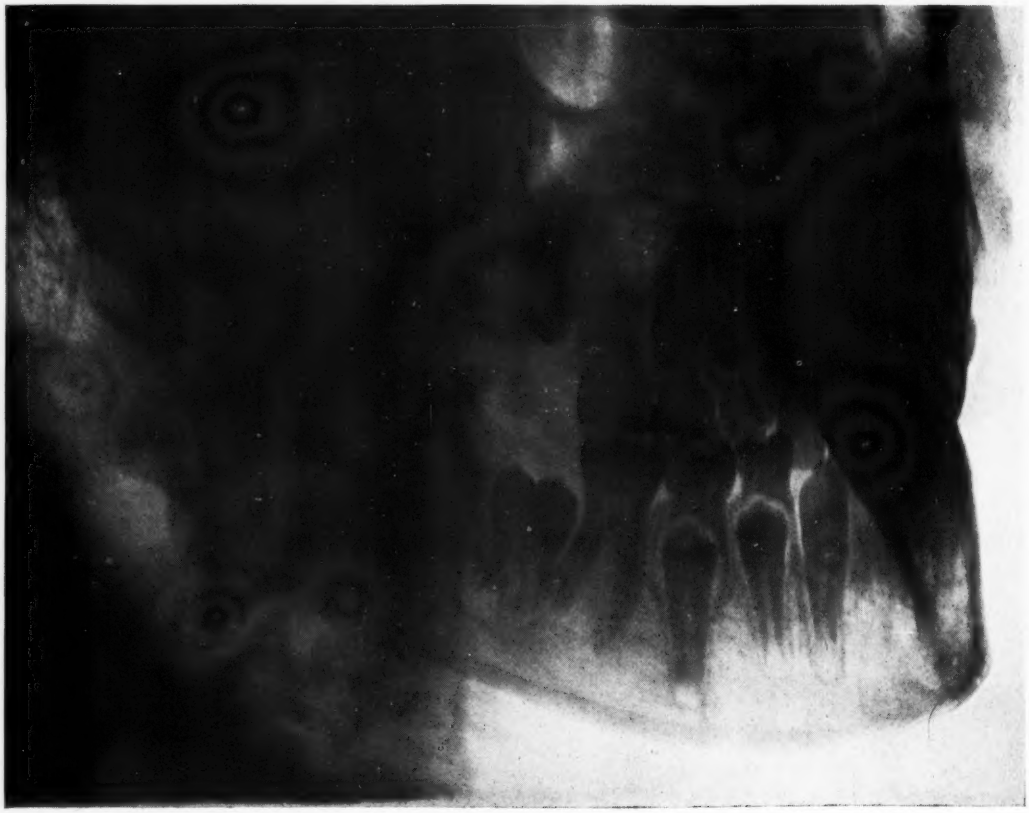


Fig. 15.

Figs. 14 and 15.—These radiographs are an instance of the utility of the x-ray in determining the state of dentition of a young patient where deciduous teeth are still present. The technic used is illustrated in Figs. 6 and 7.

the nasal cavity and its accessory sinuses, may be radiographed by passing the rays directly through the skull. In this instance, the shadow of the spine will be superimposed upon the dental structures, but owing to the fact that it is so far removed from the plate, its shadows does not interfere seriously. It is also important, in making these pictures, to have the patient's head supported in such a manner that it can be held still for a longer period than is required in making the exposures of the other areas mentioned.

I do not wish to imply by the preceding remarks upon technic that the few rules enumerated constitute a safe and never failing means of producing good radiographs. There are many points to be considered which cannot be included in so limited a discussion, such as the mechanics of tube regulation, coil operation, exposure and development of plates, and last but not least, the variations from the given rules of technic made necessary by the anatomic variations in the dental and oral structures of patients. Therefore the rules of technic which have been presented must be accepted only in the light of principles.

AN EFFECTIVE METHOD FOR THE MESIAL OR DISTAL MOVEMENT OF INDIVIDUAL TEETH IN THE ARCH.

By Harry E. Kelsey, D.D.S.
Lecturer on Orthodontia, Baltimore College of Dental Surgery, Baltimore, Md.

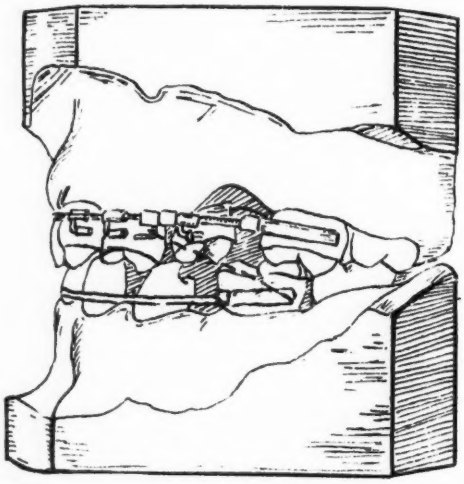
IT is not likely that the application of force as described in the following paragraph is original, although the writer has not seen it described elsewhere. It has, however, proven most useful and effective in his hands, and is a possible addition to the technic of such operations. The writer finds it chiefly useful in opening up spaces in the arch that have been lost after the extraction of teeth, or in cases where certain teeth are congenitally absent, notably the lateral incisors.

The method consists in applying an arch which has been threaded throughout its entire length and upon which tubes with attached hooks have been placed, so that they may run freely upon the arch. Bands are then placed upon the teeth adjacent to the lost space—in case of a missing lateral they would be upon the cuspid and central incisor—these bands having horizontal tubes soldered to them parallel to the arch and large enough to receive a 30/1000 wire of which the hook is made. The writer prefers to use square wire for the arch, as it is less liable to break when bending after being threaded, and small nuts which are used behind the sheath hooks may always be kept snug and tight on the arch by a slight compression, thus preventing any tendency to loosen, as is the case when a round arch is used.

Reciprocal anchorage can often be entirely depended on for opening up a space, that is, the teeth on either side of the space may be operated against each other, but as much additional simple anchorage may be added thereto upon either side of the space as there are teeth to include in it, and this

simple anchorage may be made stationary or not as desired, according to the manner of its attachment to the arch. If it is desired to tip a tooth instead of moving it bodily, and at the same time prevent rotation, a small U-shaped crotch may be attached either mesially or distally upon the band, and the arm from the sliding tube may be made to extend lingually to engage in the crotch, after which the ends may be bent over to secure it, or it may be secured with a ligature.

When rotation of a tooth to be moved mesially or distally is desired, it may be accomplished, if not too extensive, by applying the tube and sheath hook in such a manner as to produce the desired result, that is, the arm of the hook will be bent so that it is not exactly parallel to the tube but may be forced into it through the elasticity of the arch. If, however, considerable rotation is required, it is better to place a lug on the band as for any rotating ligature, and carry it around either the mesial or distal surface of the



Showing author's method for the mesial or distal movement of individual teeth in the arch.

tooth according to which way it is to be rotated, twisting it around the movable sheath hook instead of upon the arch itself. As the sheath hook is then moved by the nut back of it, the tooth will not only move mesially or distally as the case may be, but will rotate at the same time.

A hook for the intermaxillary elastic may be devised by soldering same to a small nut which may be screwed upon the arch to any convenient position and move forward or backward as the requirements of the other apparatus demand. Of course the anchorage necessary to move distally a tooth in one arch must be extensive, and it is usually necessary to supplement the anchorage in the one arch by an intermaxillary anchorage to the other.

The illustration shows a case in which both permanent laterals are missing and a second temporary molar had been impacted between the sixth year molar and second bicuspid until maturity. All of the anterior teeth from the left second bicuspid to the right central must be moved distally toward the left sixth year molar.

TREATMENT BY THE ORTHODONTIST SUPPLEMENTING THAT BY THE RHINOLOGIST.*

BY A. H. KETCHAM, D.D.S., DENVER, COLO.

IN the paper just read, Dr. Noyes has shown how the dental arches, bones of the face and the nasal cavity develop normally in response to perfectly balanced forces. He has also shown how they develop abnormally in response to interference with normal forces. It is my purpose to show how the orthodontist may overcome abnormal forces; how he may interrupt the progress of the abnormal formation of the bones and tissues of the jaws, the face and the nasal cavity, as well as the accessory sinuses; how normal forces may then be made to act so that abnormal development may give way to normal development, and the poorly developed mouth-breather, who usually is backward mentally as well as physically, may be induced to develop along physiological lines.

I understand that many of your patients are mouth-breathers, breathing through the mouth at least part of the time; that the principal cause of mouth-breathing is the presence of adenoid vegetations; that you often have associated with these, enlargement of the tonsils and also a deflected septum. The other causes of nasal stenosis—such as a deflected septum due to trauma, hypertrophy, ledges and spurs, and also hypertrophy of the turbinates, do not occur as frequently. I find by experience that many of your patients over 7 or 8 years of age, upon whom you have operated for adenoids, have not been cured of mouth-breathing. Dr. Noyes has shown the reason for this, for if an abnormal force such as breathing through the mouth has been operating for a considerable length of time, lack of development of the involved bones and muscles, malocclusion of the teeth, with hypertrophy of the lining membrane of the nose, due to altered atmospheric pressure, must result.

In order to make certain that my experience was not exceptional, I sent a list of questions to eighty-five orthodontists of full experience, most of whom replied, and their answers show that the majority of the orthodontist's patients are mouth-breathers when first examined,—though most have undergone an operation for removal of adenoids. The minority, though afflicted with malocclusion of the teeth and more or less constricted dental arches, have sufficient breathing-space and have never suffered from enlarged adenoids or other form of nasal obstruction. I do not know what percentage of your adenoid cases have broad dental arches with well-developed nasal spaces, but I take it for granted that it is very small; for, in these cases, the presence of adenoids—unless in large masses—would not interfere with the patient's breathing. The evidence which is forced upon the orthodontist is that while the adenoid operation is quite necessary, it alone is not often a cure for mouth-breathing, except in the younger patients where the cause had been operative for but a short time and has not caused malformation of the bones or abnormal development of the muscles involved, although at the early age of 4, and $4\frac{1}{2}$ years, great malformation may result as is shown in Fig. 1.

*Read at the meeting of the American Laryngological, Rhinological and Otological Society, Philadelphia, May 14, 1912. With appendix and several illustrations added to show the improvement in occlusion of the teeth up to date.

You may ask: When the rhinologist has failed to establish normal breathing, how can the orthodontist relieve this condition? In the first place, I will take for illustration an aggravated case (Figs. 2 and 3), from that type in which there is ample breathing-space after adenoids have been removed, yet the child continues to breath through the mouth. It is impossible to close the lips on account of the protrusion of the upper anterior

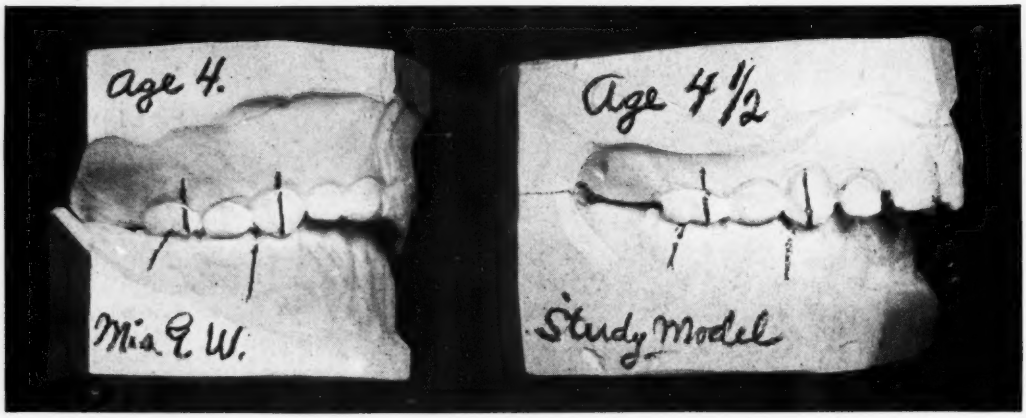


Fig. 1.

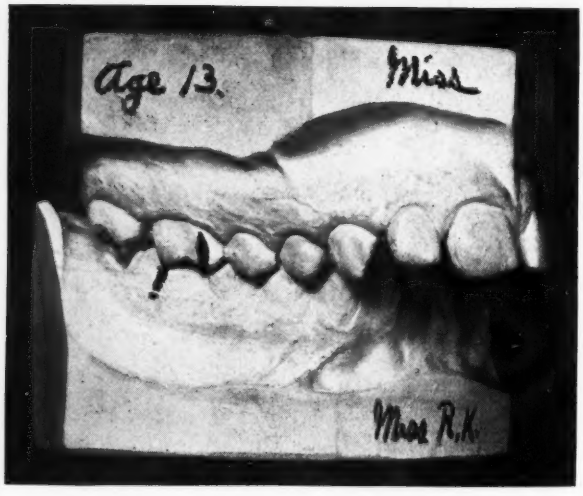


Fig. 2.

teeth. You can readily see that by reducing these abnormal relations that the orthodontist can make it possible for the patient to close the lips and breathe through the nose (Figs. 4 and 5). This also established a normal distribution of the forces of occlusion in the mastication of food; of tongue-pressure inside the dental arches and of lip and cheek-pressure outside, and the establishment of normal air-pressure in the nasal cavity. By use, the weak upper lip is developed. By eliminating abnormal exercise—in making it impossible for the lower lip to be drawn in behind the upper incisors—its thickness is reduced. The muscles which hold the mandible forward are strengthened, and the mouth is kept closed by the wearing of intermaxillary elastics from the region of the upper canine to the lower first molar. These

ligatures are usually worn day and night during the active period of treatment and at night during the period of retention, which should last until mouth-breathing has been overcome.

Now comes the question of those cases in which the nasal space is lacking

Fig. 3.

Fig. 5.

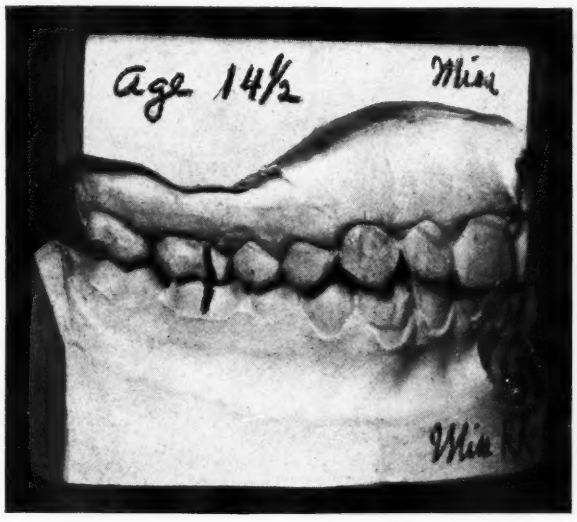


Fig. 4.

in development, in which the dental arches and maxillary bones are narrow, in which the removal of adenoids has been of no appreciable benefit to the breathing. What can the orthodontist do to help these cases? In the younger patients he can establish a balance of the forces of occlusion and thus

stimulate growth and overcome the arrested development by applying gentle pressure to the teeth, gradually widening the dental arches and placing the upper and lower teeth in their normal relations, so that the force in masticating food is transmitted through the teeth to the maxillary bones and their

Fig. 6.

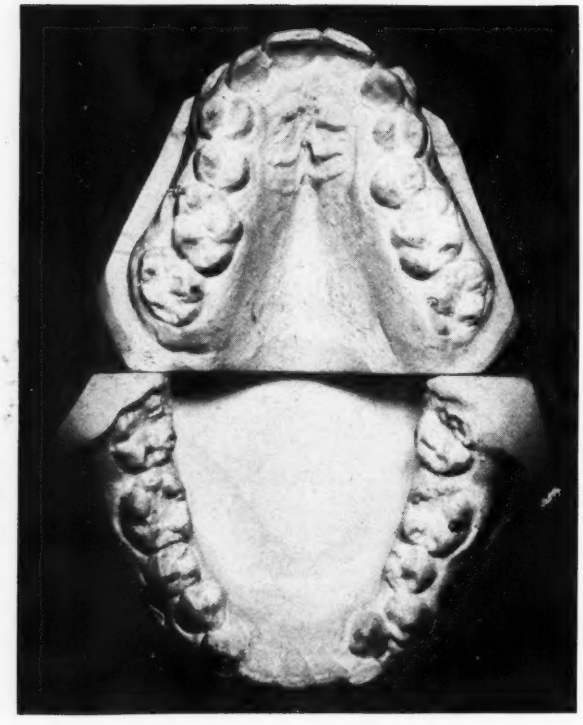


Fig. 7.

palatine processes which form the floor of the nose. These forces which are now correctly distributed will continue the development and widening of the nasal cavity. When the septum is deflected it will usually be benefited. Of course, we cannot hope by this means to overcome deflection due to trauma,

hypertrophy, ledges and spurs. You may think that I am oversanguine, but the evidence furnished by orthodontists is overwhelmingly in the affirmative. A large number of cases have been cited where children with constricted nasal

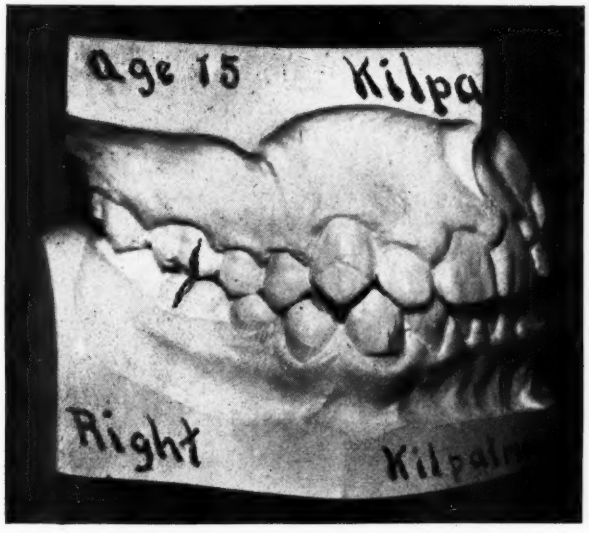


Fig. 8.

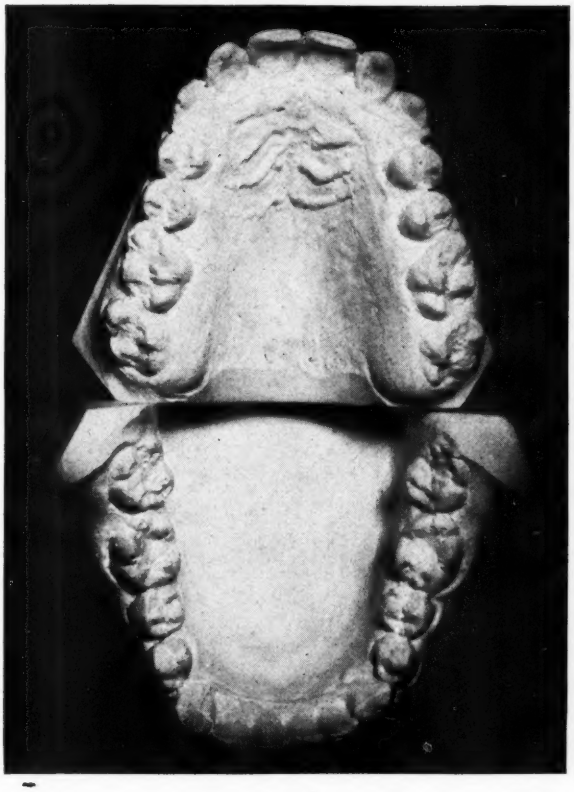


Fig. 9.

spaces have developed efficient breathing-spaces as a result of stimulation through the work of the orthodontist. The majority of these patients had improved in general health and gained in weight to a greater extent than ever

before during a similar period, and had gained more than the average child at a corresponding age; gains of from fifteen to twenty-five pounds during the first year's treatment are not at all infrequent. In many of these cases adenoids had been removed several years prior to the beginning of orthodontic treatment, the patient remaining a mouth-breather without experiencing any particular improvement in general health or the normal gain in growth and development.

This type of cases is well illustrated by Figs. 6 and 7. History is as follows: Enlarged tonsils removed at 6 years of age; adenoids one year later, but the operations were too late to materially help the nasal space or the dental arches, for growth had been so much arrested that while removal of tonsils and adenoids prevented the case from becoming even worse, yet you see what a badly-constricted arch and what maloccluded teeth the patient had at fourteen years of age when he presented for orthodontic treatment. The boy's rhinologist, Dr. T. E. Carmody, of Denver, reported that on examination he found the nasal space to be about one-half normal not only on account of narrowing, but on account of an intumescent condition of the tissues; septum deflected to the right. It was examined at intervals of several weeks and after packing with adrenalin, the intumescence would disappear and show a narrow nasal space, which became greater as treatment progressed (Fig. 7). The condition on the oral side of the palatine portion of the maxillary bones was fully as bad. The distance across the roof of the mouth between the upper second premolars at the gum-line was but eighteen millimeters.

Extraction of two or more premolars and the drawing back and down of the upper canines, would have been our only recourse a few years previous to the time this case was treated. Unfortunately such procedure is sometimes followed to-day, but it leaves the maxillary arch just as narrow as before treatment, and thus can have no beneficial effect upon the nasal cavity. It leaves the teeth still in malocclusion with no improvement in function. The patient is left with an undeveloped nasal cavity, deformed oral cavity, with little chance of reaching normal physical development. Fortunately, Dr. Edward H. Angle, a few years ago, proved that in these cases, by retaining the full complement of teeth and placing them in their normal positions, development of the alveolar process over the roots of the teeth would take place and there would be a building-in of bone. This was proved in a number of instances by carefully made models.

Since this development of the alveolar process takes place, it is logical to assume there must be a similar development of the maxillary bones, and consequent increase in size of the nasal cavity. This has been verified in many cases by rhinologists' examinations before and after the orthodontist's treatment.

By a new appliance designed by Dr. Angle, we are now able to move the roots of the teeth out as rapidly as we do the crowns; thus transmitting the gentle stimulation directly to the body of the maxillary bones.

To continue the history of this case (Figs. 8 and 9): The dental arches were widened and the crowns of the teeth placed in their correct positions. The active tooth-movement was completed in less than a year's time. The boy, who was poorly nourished and stunted when treatment was begun,

did not suffer, but gained in weight and health during the operation. At the end of this period he again visited his rhinologist who reported that the nasal space was about two-thirds to three-fourths normal, due to apparent widening of the nasal space and subsidence of the intumescence. This as a result of widening the maxillary arch. The measurements showed a gain of thirteen millimeters across the arch. Three and one-half years after active treatment was completed, his rhinologist reported: Nasal space apparently normal: septum straight; turbinates normal (Fig. 10).

Some have claimed that by widening the dental arch the roof of the mouth is lowered. Others claim that this is not ture. In my opinion, both statements are partly correct and partly incorrect. It is plain, by dropping a

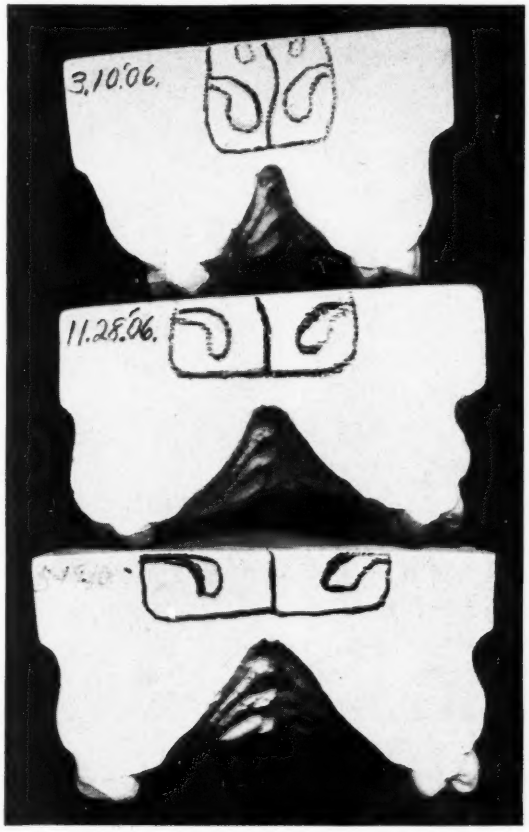


Fig. 10.

perpendicular line from the roof of the mouth to the plane of the occlusal surfaces of the teeth in Fig. 10, that the roof is higher in the finished case than in the one before treatment. Could we also measure from the apex of the nasal cavity to its floor, we should find that the distance had increased there also; in other words, there has been a general development of the bones of the face in that they have grown downward and forward as well as broader.

After 16 years of age, establishing normal balance of all the oral forces helps the nasal cavity, though not to as great an extent as in the younger child, but it is certainly worth while.

I have been asked to express an opinion as to what benefit the nasal

cavity derives from the attempted opening of the median maxillary suture, as advocated by a number of operators, principal among these being Dr. G. V. I. Brown, of Milwaukee, who was one of the first[1] to advocate this for the purpose of widening the nasal cavity and allowing the vomer to slip down into the open suture, with the expectation that the deflected septum would straighten, though this operation was mentioned in the *Dental Cosmos* in 1860.

At the outset, I wish to say that all my experience in this operation is of a negative character, in that, while I have tried to separate the median maxillary suture—both in the living subject and in a cadaver,—I have failed, or, at any rate, have not been able to prove that I opened this suture. The latter experiment was on the cadaver of a 4 or 5-year-old child in which I dissected away the tissues down to the sutures from over the palatal bones forward along the median maxillary suture up to the sutures of the nasal bones, and then carefully constructed an appliance after Dr. Brown's methods, which I anchored to the firm temporary canines and to the second temporary molars (the one upon the right side being slightly weakened as result of an abscess). I applied pressure with the jack-screw and widened the arch five millimeters, at which point the buccal alveolar plate of bone upon the right side gave way. There was no increase in distance across the opening of the nasal cavity—which I measured and marked carefully before pressure was applied to the teeth—nor had the median maxillary suture opened in the least. I cannot say whether or not it would have opened had the alveolar process around the right second temporary molar been as strong as the one on the opposite side.

In the *Dental Cosmos* for January, 1909, Dr. Brown, in speaking of opening the median maxillary suture, says; "By the aid of pressure, which is so gently applied that there is no pain and but little inconvenience for the patient, it is possible in all young persons to force the maxillaries apart by separating the median suture extending between the central incisor teeth and on through the central portion of the hard palate. This method is also practicable in older persons, as is shown in our illustrations. Evidence of this is given by the fact that the central incisors are moved apart without an attachment or a direct pressure of any kind being applied to these teeth."

Some operators, including myself, have attempted to show by the means of radiographs that the median maxillary suture has been opened. Our radiographs have failed to prove that the suture has been opened except between the pre-maxillaries.

In answer to Dr. Brown's argument that the suture has been opened because the central incisors were moved apart, I would say, it is often the experience of an orthodontist when widening the upper dental arch,—especially by means of the appliance known as the expansion arch,—that if he ligates the canines to the wire arch without ligating the incisors, a space will soon develop between the central incisors. I can explain it from a fact which I discovered a number of years ago while studying the suture between the pre-maxillaries by means of the radiograph,[2] that this suture was open in

1.—Report in the Journal A. M. A., March 27, 1909.

2.—The results were given in a paper read before the Alumni Society of the Angle School of Orthodontia, at St. Louis, December, 1906, and published in the American Orthodontist, Vol. 1, No. 1.

depths of from one-third to the full length of the central incisor's root in two-thirds of the cases examined.

Dr. George Wright, of Boston, in June, 1911, *Cosmos*, reports: "Up to the spring of 1910 I could safely say that in some instances I have known the inter-maxillary and palatine suture to be unossified and susceptible of comparatively easy separation as late as 35 years. When I discussed this question with Professor Hirdlicka of the National Museum at Washington, where I examined many skulls, he agreed with me, and showed me some skulls of Eskimos whom he had known when living and of whose age he was sure. These are as old as 50 years and showed the distinct evidence of inter-membranous tissue in the inter-maxillary suture and no evidence of ossification. A skull in his collection illustrating this, is numbered 226,152. There are many others."

My studies with the radiographs confirm Dr. Wright's observation in as far as the open suture applies to the pre-maxillaries.

I wish to caution against accepting evidence furnished by radiographs

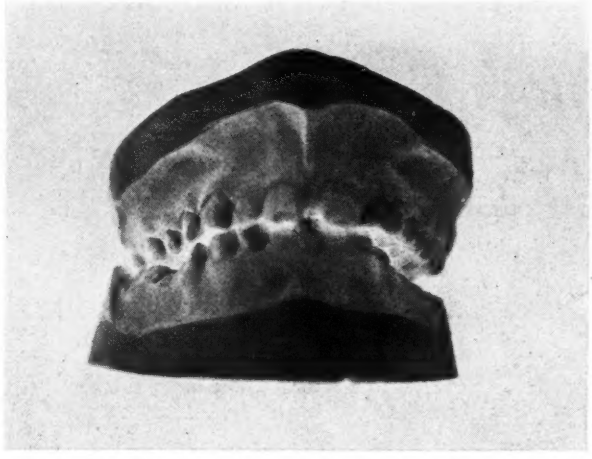


Fig. 11.

unless very carefully and skillfully made, and then interpreted as skillfully. A thick nasal spine or vomer may give the impression that the suture has been opened, as illustrated by a case where the dense walls of the nasal spine were caught on edge so as to stop the rays, while the light penetrated the thinner cancellated bone between these plates easily, giving the appearance of an open suture in this region.

While I have been unable to secure proof that the median maxillary suture has ever been opened by rapid widening of the dental arch, yet I believe that it may be possible to do this in the case of young children, but, it is in these cases that we can secure most beautiful results by gradual tooth-movement, thus stimulating bone-development, which is not alone along the lines of the sutures, but in the body of the bones as well, and in this we are working along physiological lines,—aiding Nature to attain the normal, and not abruptly attempting to open the suture and practically producing a fracture by widening the arch in two weeks' time, as Dr. Brown recommends. Neither is the actual time of treatment shortened, for all the

teeth must be placed in their normal positions whether the arch be widened rapidly or slowly. Then they must be retained for a year or two. The shorter the active period of treatment the longer the peroid or retention, for the teeth must be supported until Nature builds permanent bone-retainers. Dr. Albin Oppenheim, of Vienna, after extensive investigation, has shown that by the application of powerful forces as in the rapid widening of the maxillary arch, the vitality of the periosteum is so lowered that a long period of time is required to regain the normal physiological condition so it may transform the new bone to retain the teeth.[3]

Dr. George Wright has designed an instrument for measuring the nasal space, as also Dr. Lee W. Dean of Iowa City, and although there is chance for error in the use of these instruments they confirm the rhinologist's observations of increased nasal space, especially in the case of Dr. Wright's instrument when he measures between the naso-antral walls at a point beneath the inferior turbinates.

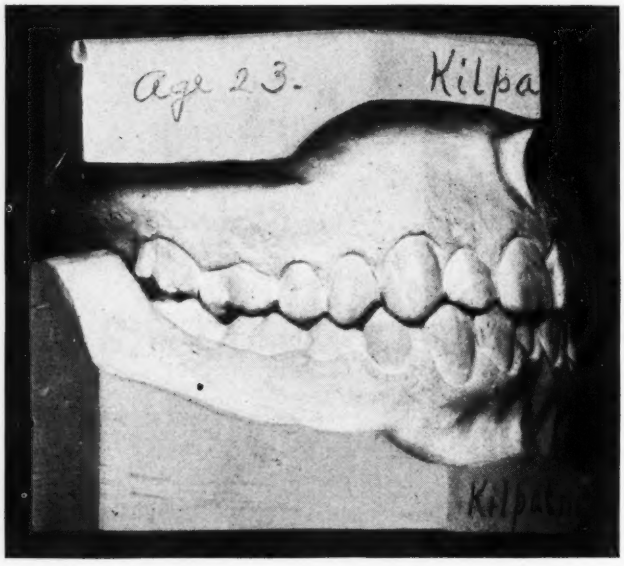


Fig 12.

In regard to patients 16 years of age or older, we have reliable data that the nasal space has been increased in size from the rapid widening of the dental arch, yet we also have reliable reports from rhinologists that the breathing-space has been improved in these older cases where the more gradual widening of the dental arch was practiced. I believe that in both cases the improvement in breathing was due to development as a result of the stimulation upon the maxillary bones of placing the oral cavity under the influence of normal forces so that it could functionate properly.

I think that all the gentlemen who advise the rapid widening of the maxillary dental arch, also advise widening of the lower arch, if that is constricted as well, so that the upper and lower teeth may occlude properly. That this has not always been practiced is evident from this case (Fig. 11), in which the upper buccal teeth were pushed out until they occluded outside the lowers, and until the central incisors were separated.

3. The American Orthodontist, January, 1912, page 129.

History of case reported by Dr. M. N. Federspiel, of Milwaukee: "A lady, about 19 years of age, reported to my office about a year ago. She consulted a rhinologist about five years ago on account of suffering from an acute suppurative inflammatory condition of her nose. Her rhinologist informed her that she had a deflected septum and suggested to her that it could be straightened by radically expanding the upper arch. She was directed to a specialist and an appliance was placed in her mouth with jack-screws, and the upper arch widened in about two months, causing her centrals to separate. Nothing was done to the lower arch. She wore a retainer for a year and was discharged cured. Upon examination I found that the septum was still deflected, but the nose otherwise normal. I asked her if it was easier for her to breathe since the arch was expanded, and she said that

Fig. 13.

she could not notice any difference." A result like the one shown in Figure 11, leaves the oral cavity in a condition which is a greater menace to health than the nasal condition could have been.

I believe we cannot hope for any permanent benefit from this operation unless the teeth are left in their normal relations, so as to be under the influence of normal forces and stimulate normal function.

As near as I have been able to determine, absorption of adenoid tissue is not hastened by the widening of the maxillary dental arch and the consequent increase in the size of the nasal cavity.

In my own experience adenoid tissue has increased in size in at least two cases while the patients were under my care; in other words, colds and

infection more than counter-balanced any beneficial effect that expansion of the dental arch migh have had upon the adenoid tissue. A number of instances have been cited where adenoid tissue has atrophied, or partially so, during the widening of the maxillary arch, but it was at the time of puberty so was probably not due to the intervention of the orthodontist. Also direct benefit to the tonsils from orthodontic work does not seem to result unless there would be less likelihood of infection of the tonsils, by the orthodontist changing a mouth-breather to a normal breather.

To be of the greatest benefit to humanity, the rhinologist and orthodontist must work together, for the work of one often supplements that of the other. The orthodontist cannot hope for permanent success in a case where mouth-breathing has caused malocclusion of the teeth, unless the rhinologist removes the primary cause of the mouth-breathing. Our most careful operators explain this when starting a case and insist on the removal of adenoids and tonsils if necessary. It would be well if the orthodontist were as competent as the average rhinologist to make diagnosis of nose and throat conditions,—you notice that I say rhinologist, and not physician, for sometimes our patients will consult the family physician instead of the rhinologist, and bring a clean bill of health as far as nose and throat conditions are concerned, and we find that the child is suffering from nasal obstruction. Then, too, the orthodontist would be better able to advise the patient and would understand the conditions with which the rhinologist has to contend, and be less inclined to blame the rhinologist while struggling to correct the malocclusion of an unusually obstinate mouth-breather.

The rhinologist is dependent upon the orthodontist in many cases. The best informed operators will not do an adenoid or tonsil operation, after the adenoid tissue has caused mal-development of the bones and tissues of the nose and mouth, without explaining how futile it is to hope for any great benefit unless the patient also receive orthodontic treatment. In younger patients suffering from a deflection in the cartilaginous portion of the septum, the operator will ascertain if the maxillary arch should be widened to allow the nasal cavity to develop and the septum to straighten before an operation is performed. It would also be well if the rhinologist were as competent to make diagnosis of malocclusion of the teeth as the average orthodontist,—not dentist, for the average dentist is no more competent to make diagnosis of these conditions than the average physician is of nose conditions. I believe that the time will soon come when there will be a chair of orthodontia in medical schools, especially post-graduate schools of laryngology and rhinology, just the same as there are chairs of rhinology in our best schools of orthodontia. Then reasons for the continuance of mouth-breathing after operation in many cases will be understood and habit will not be made the scapegoat.

Today, our patients are not receiving the full benefit of modern science unless they have an opinion from both the rhinologist and orthodontist. The practitioner who, in the cases we have discussed, does not bid the patient consult the other specialist, be he orthodontist or rhinologist, is occupying a position that is indefensible.

APPENDIX.

To bring the case shown in Figs. 6 to 10 up to date, Figs. 12 and 13 are added. These give an idea of the improvement in occlusion of the teeth; the continued broadening of the dental arches; the development of the pro-

Fig. 14.

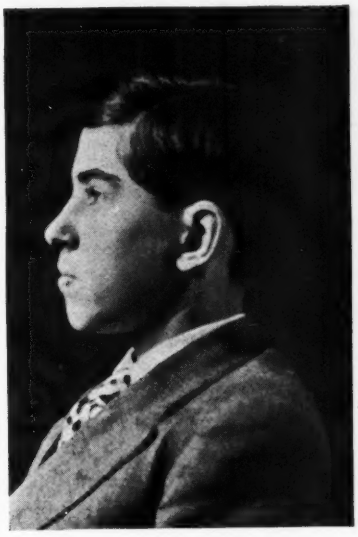


Fig. 15.

Fig. 16.

Fig. 17.

cess over the roots of the teeth; also the improvement in the angle of inclination of the maxillary teeth. All these are brought about by placing the teeth in normal relations and establishing normal functions.

Fig. 14 shows the face of the young man as it appeared when the

models, Fig. 6, were made. Note the lack of development and weakness of the lower part of the face. Fig. 15 shows the face directly after the active period of treatment. Note the over-development of the lips due to their abnormal exercise over the old form of appliance; also to the tipping out of the teeth at an abnormal angle. Fig. 16 shows the improvement in features four years later. Development of the lower part of the face is now nearly normal. Fig. 17 shows the young man's face as it is today. Note the fine balance of the features and the strength of character shown. There would have been no possible chance for the young man to have attained this fine development with his original condition of crippled masticating apparatus and deformed maxillary bones. February 11, 1915, Dr. Carmody reported nasal conditions and breathing space normal.

In regard to the young lady whose case is shown in Figs. 2 to 5, the orthodontist under whose observation she is at the present time reports continued improvement.

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Also correspondence upon the subject from over fifty orthodontists.

THE TECHNIC OF ACCURATE IMPRESSION TAKING.

By Samuel J. Lewis, D.D.S., Kalamazoo, Mich.

THERE seems to be so much contention among orthodontists at the present time as to methods employed, and materials used, in taking impressions of the jaws that the writer has deemed it timely and necessary to prepare this treatise. It is written with the hope that it may point out a way to improve the technic of those operators who have been negligent in this all-important part of practice, and also to defend the use of plaster as an impression material.

Accuracy should be the watchword of the orthodontist, whether he is taking an impression or cementing a band, and in no department of his work should each step be taken with more care than taking the impressions with which to produce a record set of models. Models are valuable only in proportion to their accuracy, and accurate models can only be made from impressions that are taken in plaster of paris.

The writer has heard directly and indirectly that it is possible to get as good, if not better, results by using modeling compound as an impression material, but he has failed, so far, to see any of these results. On the other hand, among the most successful orthodontists, one will find plaster used exclusively for impressions, where record models are to be made. While modeling compound is an excellent material with which to get a reproduction, we know that it is impossible to remove an impression, made in this material, from the mouth without distortion, except, perhaps, in some deciduous jaws. In view of this fact, and knowing as we do that accurate models are necessary for the proper study and planning of treatment, it is obvious that there is only one material that is adequate, and that is plaster of paris. Dr. Martin Dewey in his work on orthodontia, states that modeling compound has a place in dentistry, but not in orthodontia, and the writer concurs with him fully.

If the reader will spend a little time and thought mastering the following technic of taking impressions, or a modification of the same, it will be found that it is not as difficult an operation as it may seem.

Preparation of the Patient.

Before one should attempt to make an impression of either jaw, a thorough examination of the mouth should be made to ascertain the condition of the soft tissues, the existence of cavities in the teeth, loose teeth, missing teeth, the presence of a soft deposit around the necks of the teeth; in fact the general condition of the mouth as a whole. If any of these conditions exist, they should be remedied, otherwise accurate results are impossible. Even though everything seems to be in a perfect condition, the teeth should be polished so as to remove all foreign material; but the impression should not be taken immediately after this is done. The reason for doing this is that immediately after the polishing process, there is more or less blood present, and the natural lubrication of the teeth has been removed, leaving a condition which is not conducive to good results. A few hours, at least, should elapse before the impression is taken.

In examining the mouth, the best position of the patient is a straight one, having the jaw to be examined on a level with the eye. Either a Dunn speculum, or a mouth mirror is used, so that every part to be reproduced can be seen. When this is done, a mild alkaline wash is sprayed over the entire mouth, and a stream of air directed at the free margin of the gum of all the teeth. This causes the gum to stand away from the teeth, and by the time the operator is ready to take the impression, the margin will have returned to its normal position, and will allow a very accurate reproduction.

FITTING THE TRAYS.

The mouth being properly prepared, the next step is fitting the trays. While this seems a simple thing, lack of attention here will give rise to poor results.

Trays are made in many sizes, by various firms, but they must be fitted to every individual mouth before an accurate result can be had. A tray is chosen about the size needed for the upper jaw, and is introduced in the fol-

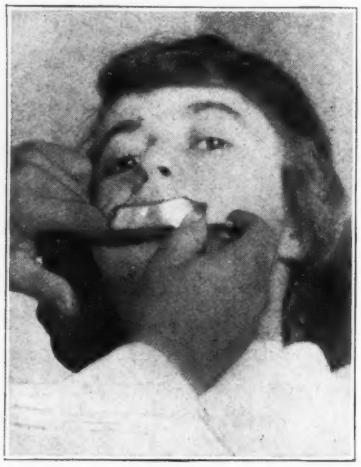

Fig. 1—Showing the upper tray in position when introducing it into the mouth.

lowing manner: The operator stands in front of the patient with the tray grasped in the right hand; the right corner of the mouth is drawn outward with the forefinger of the left hand, and the right heel of the tray placed in the left corner of the mouth (Fig. 1). By a rotary movement, the left heel of the tray can easily be placed in the mouth, and the tray gently pushed back to engage the tuberosities. The anterior part of the tray is then tilted downward so that the relation of the tray to the tuberosities can be seen; then it is tipped upward and pressed gently until the teeth touch the bottom of the tray. If the patient experiences any pain from pressure, the places causing it are trimmed until the tray will rest in that position without a feeling of discomfort. It is also necessary to note whether or not there is sufficient space between the lateral walls of the tray and the buccal teeth, for either too much or too little space is not good. The space should measure about one-fourth of an inch. The tray should not press against the buccal muscles and mucous membrane, nor should it extend too high anteriorly so as to interfere with the frenum labium. There should also be plenty of space

for the plaster all around the teeth and jaws so that no portion of the impression will be too thin. If so, this will interfere materially when the impression is to be removed from the mouth.

The upper tray being properly fitted, the lower one is tried in. As the lower trays, especially the Angle trays, are too narrow antero-posteriorly, a notch is made on the lingual portion, and the parts overlapped. This will give more room for the plaster immediately behind the incisor teeth, and will be of great benefit when removing the impression. The lower tray is placed in the mouth in exactly the same manner as the upper, with the exception that it is tilted upwards so that the posterior angles of the jaw may be seen.

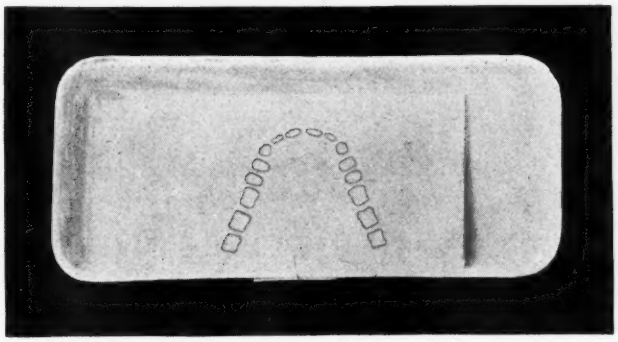

Fig. 2—Tray and diagram on which pieces of impression are laid.

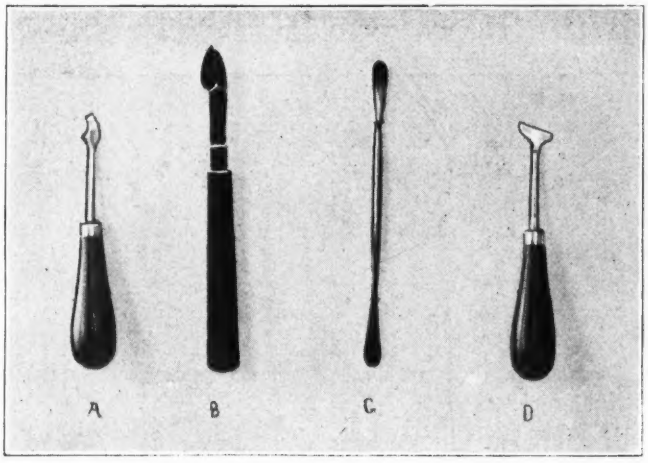

Fig. 3—Instruments used in impression taking. a, Lane Groover; b, Grunberg Groover; c, Grunberg Applicator; d, Lane Separator.

It is then tilted downward until the incisal and occlusal surfaces of the teeth touch the bottom. The sides are trimmed in exactly the same manner as the upper, so the tray will rest comfortably in the mouth. The trays are then laid aside until needed.

ARRANGEMENT OF INSTRUMENTS.

The auxilliary instruments used are a tray and diagram devised by Dr. W. S. Watson (Fig. 2), a Grünberg applicator, a Lane or Grünberg groover, and a Lane separator (Fig. 3); a mixing tray and plaster holder (Fig. 4); a mouth mirror, a pair of college pliers, and a few pieces of Japanese bibulous

paper. These should be placed in advantageous positions so that they may easily be reached, either by the operator or the assistant. The writer prefers to have everything but the plaster holder, mixing tray, and impression trays on the bracket table, as they may easily be reached with the right hand.

Upper Impression.

The patient is placed in an upright position with the head tipped slightly forward. This will help to prevent any excess plaster from flowing into the pharynx, and will largely do away with gagging. The patient is covered with a large napkin, and a rubber bag is tied around the neck, as shown in the illustrations. This will catch any saliva that may trickle out, and will serve as a receptacle to place any small fragments of plaster in. A small

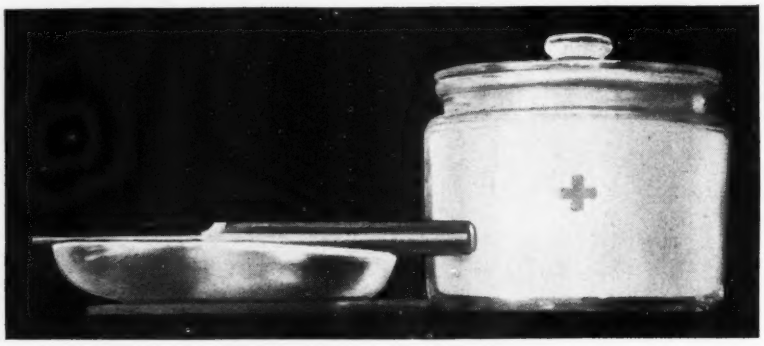

Fig. 4—Mixing tray and plaster holder.

A B

Fig. 5—Showing plaster in trays preparatory to inserting them in the mouth.

quantity of vaseline is rubbed over the lips of the patient to prevent them from drying, and so causing unnecessary pain. The plaster is then sifted into the small shallow dish (Fig. 4) containing a little warm water, and when the dish can be turned upside down without the plaster running out, the plaster will be of the proper consistency. The tray is then filled in the following manner: the spatula, which should be quite large, is filled with plaster, and this placed on one side of the tray, from the median line to the heel. With another spatula full, the opposite side is filled, a third portion, not quite as large as the second, being placed anteriorly, but not covering the outside of the tray (Fig. 5A). (The plan of extending the plaster onto the handle of the tray has been discarded by most operators, as it leaves a messy area.)

When the tray has been filled as described, the operator steps in front

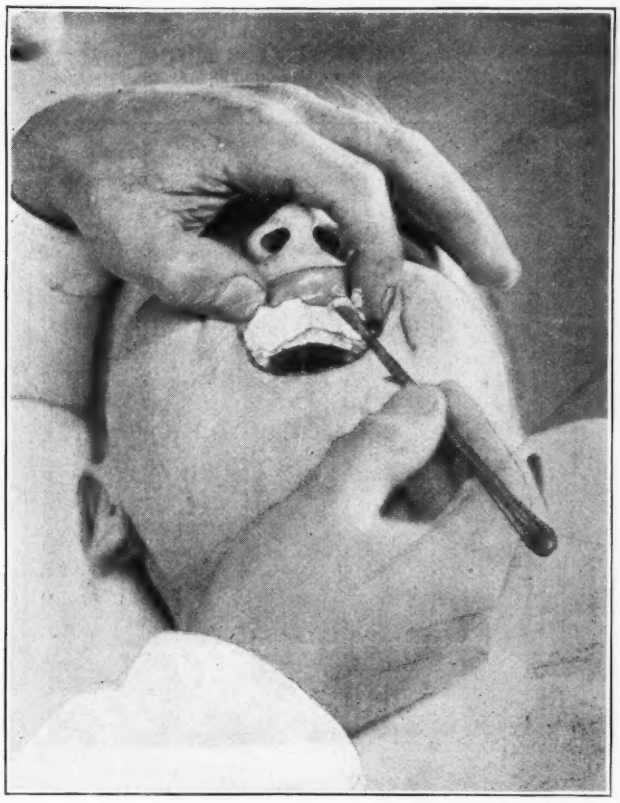

Fig. 6—Showing method of holding upper lip away while placing plaster in the embrasures.

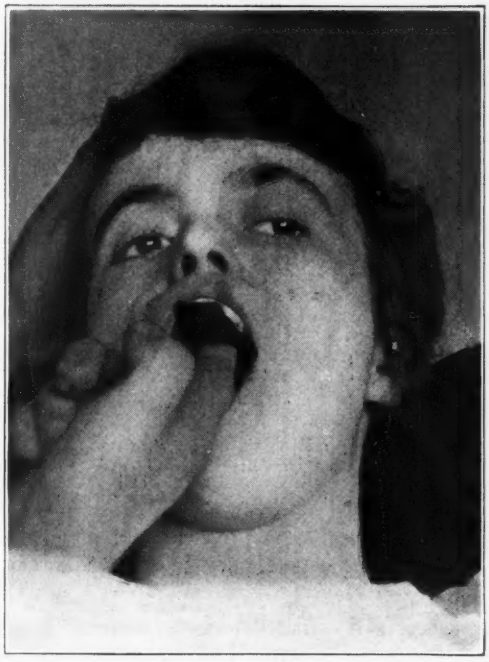

Fig. 7.—Showing position of the forefinger after the upper tray is placed in the mouth.

of the patient, while the assistant stands on the left side with the mixing dish in her hand. The patient is told to relax the muscles, and to open the mouth slightly while the operator works the soft plaster all over the buccal

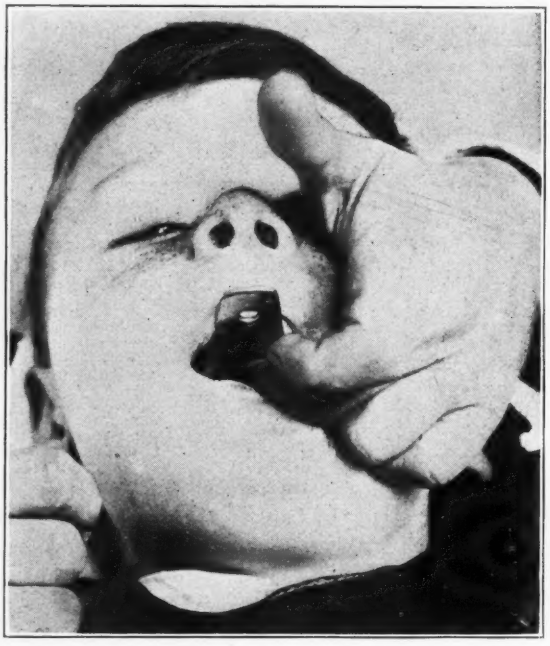

Fig. 8—Showing position of the left middle finger after the operator steps to the rear of the patient.

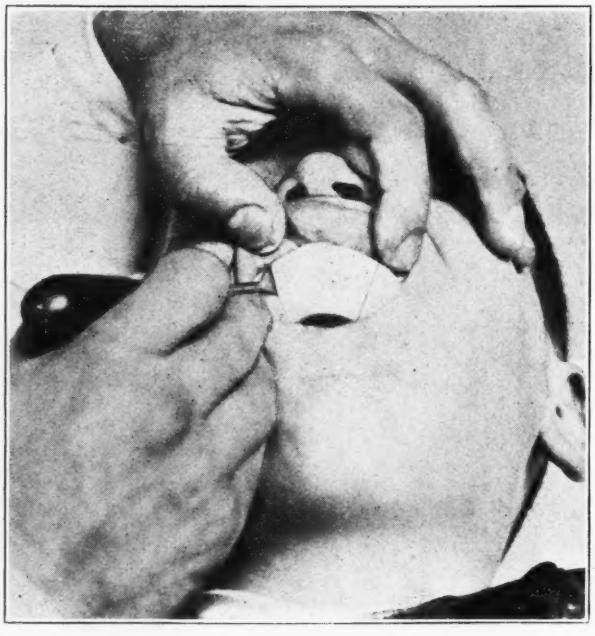

Fig. 9—Showing grooves in the plaster and method of holding the lips away and using the Lane separator.

and labial embrasures with a suitable instrument, such as the Grünberg applicator (Fig. 3C). When working the plaster around the labial embrasure, the lip is held away with the thumb and index finger of the left hand

(Fig. 6). This being completed, the filled tray is taken in the right hand; the right corner of the mouth being drawn upward and outward with the index finger of the left hand, and the right heel of the tray placed in the left corner of the mouth (Fig. 1). Now by a slight rotary movement, the tray is placed in the mouth, and adjusted carefully at the tuberosities. The tray is then tilted upwards so as to engage the anterior teeth, and with a slight upward and backward movement, it is pushed home, care being taken, however, that the tray is adjusted so that both lateral walls stand equally distant from the buccal teeth. Otherwise, when the impression is removed, it will not be symmetrical. The upward and backward pressure will cause the plaster in the tray to flow backward, expelling any air or excess plaster, which can be removed with a small mouth mirror. The tray now being in its proper place, the index finger of the right hand is placed in the palatal

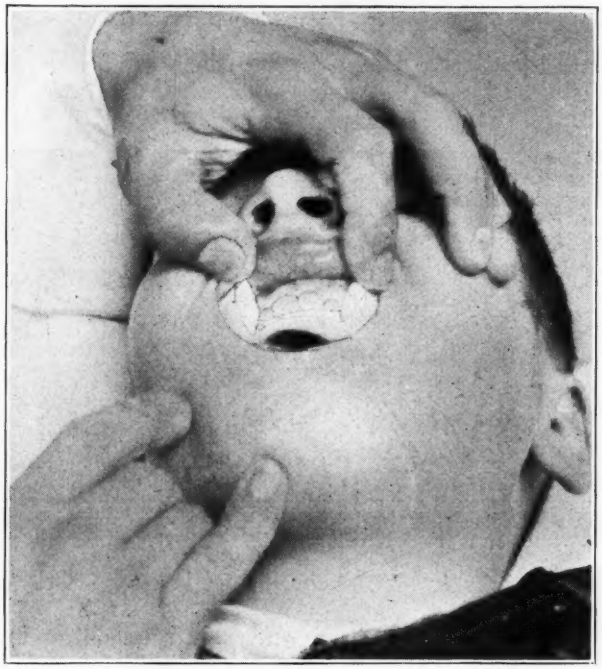

Fig. 10—Showing the anterior part of the impression removed.

portion (Fig. 7), and while being held firmly, but gently, the operator steps to the rear of the patient. The left middle finger is now substituted for the right index finger (Fig. 8), and the lips and cheek pulled out gently so that the plaster in the embrasures will be properly distributed. The tray is held in position with the left middle finger until the plaster has hardened. The time for this depends upon the kind of plaster used, and also the weather conditions, but usually about five minutes will be sufficient. During the setting process, the tray must be held firmly, as any slight movement will cause an inaccurate result.

When the plaster has hardened sufficiently, any excess on the outside of the tray is removed with a pair of college pliers. The operator, standing in front of the patient, then grasps the handle of the tray firmly between the thumb and index finger of the right hand, and tips the tray downward until

there is a separation anteriorly. Then, by pushing the tray upwards, the heels are disengaged, and the tray removed from the mouth by a rotary movement. The mouth is then swabbed with small tampons of cotton, removing all small particles of plaster, and the periphery of the mouth cleaned. The upper lip is now held with the thumb and the forefinger of the left hand, and the impression grooved horizontally in the region of the cuspid teeth with either a Lane groover (Fig. 3A) or a Grünberg groover (Fig. 3B). This groove should not be too wide or too deep, and should not extend quite through the plaster (Fig. 9). A Lane separator (Fig. 3D) is placed in the groove on one side, and turned slightly outward until a break is heard. It is then transferred to the opposite side, and this movement repeated. This will usually break off the anterior portion (Fig. 10), although this operation may have to be repeated several times before this piece can be dislodged. Unless the operator holds the entire lip away from the impression, the anterior portion may split in two, or more parts.

After the anterior portion of the impression is removed, the right thumb is placed against the left lateral, buccal half, and, with a downward and out-

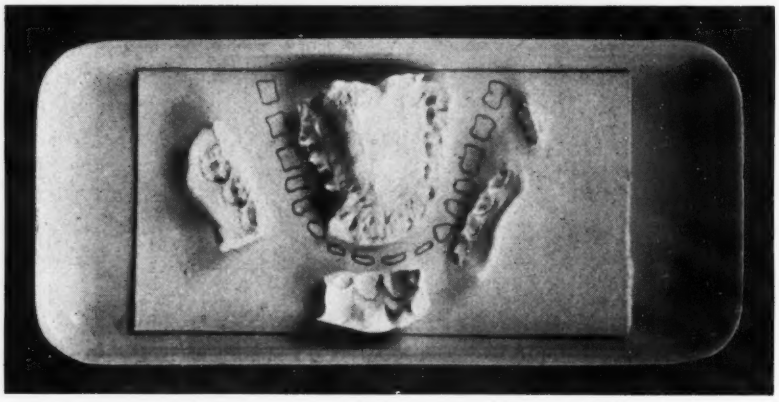

Fig. 11—Showing the parts of the impression in their respective positions on the Watson diagram.

ward pressure, that half is dislodged and removed; likewise the right side. All that remains now is the palatal portion, which may be removed by a slight rocking motion, and usually it will come out *en masse*. The parts are placed in a suitable tray, containing a Watson diagram, and any small fragments that remain in the mouth can be removed with pliers, and placed in their respective positions (Fig. 11). This tray is then placed away, and the fields of operation cleaned preparatory to taking the lower impression.

LOWER IMPRESSION.

The tray being already fitted, the first step is to place the patient in the proper position. The chair is lowered more than when taking the upper impression, and is tilted back to an angle of sixty degrees. The operator stands in front of the patient when applying the plaster to the embrasures, and when placing the tray in the mouth. The following steps are the same as when taking the upper impression, and so need no further explanation. However, after the tray is fixed in the mouth, it is held firmly by placing the index finger of the left hand immediately over the region of the incisor teeth.

With the right hand, the cheeks and lips are manipulated so that the plaster in the embrasures will be properly formed. Then a few pieces of bibulous paper are packed under the lingual surface of the tray to prevent the saliva from attacking the plaster, also to force any excess away from the tray. The operator then steps to the rear of the patient, being careful, however, not

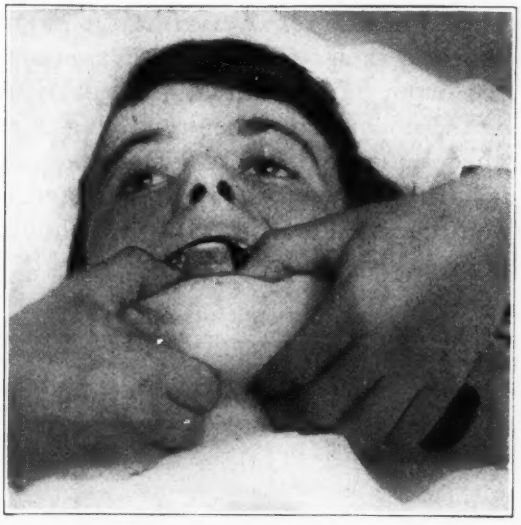

Fig. 12—Showing method of holding the lower tray after it is placed in the mouth.

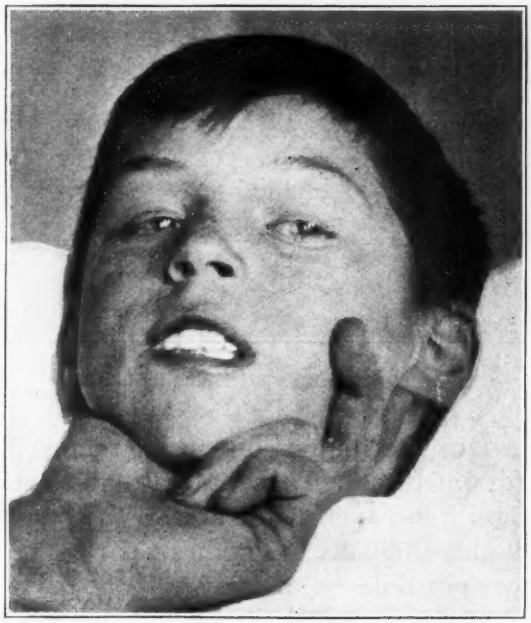

Fig. 13—Showing method of holding the lower jaw when removing the lateral halves of the lower impression.

to displace, or move the tray, and places the thumb of the left hand over the region of the premolars, grasping the lower border of the jaw with the forefinger. The right hand is now placed in the same position on the right side (Fig. 12) and the plaster allowed to set. If there seems to be an over-abundant flow of saliva, it is sometimes advisable to administer 1-150 grain of

Atropin one hour before the appointment. This will act upon the salivary glands, lessening their secretions.

When the plaster has set, any excess on the outside of the tray and in the lingual portion is removed, also the pieces of bibulous paper. The tray is removed by grasping the handle firmly between the thumb and forefinger of the right hand, and tipping it slightly upward. This will disengage the tray from the plaster so that it can be removed from the mouth by a slight rotary movement. The mouth is then swabbed with tampons of cotton, so that all surfaces are free from viscid saliva, and particles of plaster. The grooving is done as in the upper, only when removing the lateral buccal halves of the impression, the jaw is held firmly by placing the thumb of the left hand behind the angle of the jaw on the right side, and the forefinger behind the angle of the jaw on the left side (Fig. 13). This holds the jaw stationary, so that the parts can be easily removed.

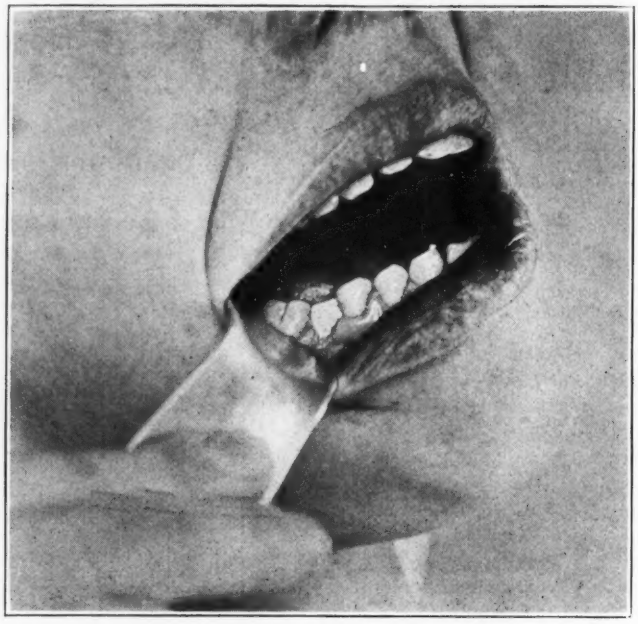

Fig. 14—Showing plaster plug in position.

The lingual part of the impression can be removed, sometimes, in two parts, but more often in three. These lateral halves are broken by placing the thumb of the right hand against the area of the buccal teeth and pushing slightly downward and lingually. As these parts are removed, they are placed in their proper positions on the tray. If the parts break so as to leave a portion of plaster in the region of the lingual surfaces of the incisor teeth, this part can be removed by tilting it backward with a pair of pliers.

The pieces having been removed and placed in the tray, the mouth is sprayed, the face washed and the patient dismissed.

Taking Impressions Where Teeth Are Missing.

Where there are teeth missing, especially where the molars have tipped forward, leaving a V-shaped space, it is sometimes very difficult to separate

the impression, bringing out all of the pieces accurately. This can be overcome by making a small plaster plug to fit the space before the impression is taken. This is done by placing some plaster in the space, and allowing it to set, after which it is trimmed so that it can be removed buccally (Fig 14). It is then removed, shellaced and varnished, and coated with vaseline. Before taking the impression, this plug is placed in position, when the technic following is the same as when taking the other impressions.

Impression to Ascertain Normal Mesio-distal Relation of the Molars.

Sometimes, when treating Class II, or Class III cases, it is advisable to study the relation of the molars as the lower jaw is being shifted mesially or distally, and this can be done in a very simple way. The patient is told to close the jaw naturally, and tip the head to one side so as to keep the saliva from running into the plaster. The cheek is held out with a Dunn speculum, and soft plaster worked around the buccal teeth. It is made thick enough so that it will not fracture when being removed. When it is set thoroughly it can be removed in one piece (Fig. 15), and a model made from it.

Fig. 15—Impression of buccal surfaces of premolars and molars for studying mesio-distal relation of molars during treatment.

Impressions for Making Retainers.

After the necessary bands are placed on the teeth, a tray which has been cut down, filled and roughened on the inner surface, is filled with plaster, and placed in the mouth in the same manner as when taking the other impressions, the only difference being that the tray is pushed down so that the plaster extends about one-eighth of an inch below the free margin of the gum. This permits it being removed *en masse* with the bands in position. A little melted wax is then flowed around the inner surface of the bands, preparatory to pouring the model. This allows the bands to be removed after the model is run, and is very advantageous when making a removable retainer.

Conclusion.

The foregoing covers all the technic of impression taking that is necessary in the majority of cases, and the reader, if interested in the technic of placing the impressions together and making the models, is referred to the writer's article on the "Technique of Accurate Model Construction," which appeared in the March, 1915, number of the *Journal.*

THE HISTORY OF ORTHODONTIA.

(*Continued from page 635*)

By Bernhard Wolf Weinberger, D.D.S.
New York City.

The Medieval Period.

MEDICAL history, according to Nicarsi, during the Middle Ages was divided into four periods—the Arabian, covering the period between the fifth and eleventh centuries, the Salernitan (eleventh and twelfth centuries); the pre-Renaissance period of the Crusades (twelfth to fourteenth centuries), and the Monastic and Scholastic periods (fifteenth and sixteenth centuries).

The Arabians derived their knowledge of Greek Medicine from the Nestorian Monks, the practical details from the Jews, and their astrological lore from Egypt and the far East. They abstained from dissecting because of religious convictions, and left operative surgery and venisection to the wandering specialists.[1] They were loyal supporters of all the sciences and were instrumental in founding hospitals, libraries, and schools. Perhaps the first hospital established was that at Misr in Egypt in 597, but not until the time of the Arabians did medical science make great headway in this respect. Medical instruction was given at either of the great hospitals at Damascus, established in 707 A.D., Cairo (874), and Bagdad (918). The principal courses were clinical medicine, pharmacology and therapeutics. Anatomy and surgery were neglected, but chemistry was held in high esteem.

As the Greeks and Romans were displaced by the Saracens, so in turn came the Turks to destroy and succeed them. The thirteenth century established the supremacy of the Ottoman Empire and Palestine was made a possession of the Turks. This led to the wars of the Crusades. Medical practice during these days retrograded, and the end of this period found medicine confined to the narrow limits of the early Greeks. The change of Constantinople from Roman control to that of the Turks, led to the expulsion of scholars from the East, and the settling of these men of great learning in the West, later to become teachers of their arts and sciences, and laid the foundation for new development and advancement through original research.

As the power of the Roman Catholic Church increased, and monkish orders were established, the monastaries became the centers of surgical and medical practice. However, in 1163, the clergy was forbidden by the authorities of the Church to practice the surgical side of medicine, as it was found that the acceptance of medical fees, the sight of many aspects of the sick that might offend modesty, the possibilities of being the cause of a patient's death, or other happenings, were somewhat inconsistent with the original intentions of holy orders.

However, there were some who assumed the duties of minor surgery and the extraction of teeth. In the course of time many of these separated themselves from the monastry, and practicing entirely among the laity, established the profession of barber-surgeons. An early as 1308 we find the

1. Garrison: History of Medicine, p. 91.

barbers united into one guild with the surgeons, and the English name of barber-surgeons for several hundred years embraced the practitioners of all the special branches of surgery.

The thirteenth century was remarkable for the impetus which was given to literature and the arts. Through the invention of paper, and later through the invention of printing presses, a new era was opened in medicine. The foundation of the earlier universities, which succeeded the older monastic colleges of Salerno and Monte Cassino, did a great deal to improve matters. Later schools were established in Valencia, Paris, Toulous, Prague, and Vienna.

From the thirteenth to the sixteenth century dentistry made but little progress. We find that the doctors and surgeons in general were little skilled in dental diseases. As one physician, Giovanni of Virgo, expressed it: "For the extraction of teeth there is needed a practical man, and therefore, many medical and surgical authorities expressed an opinion that this operation

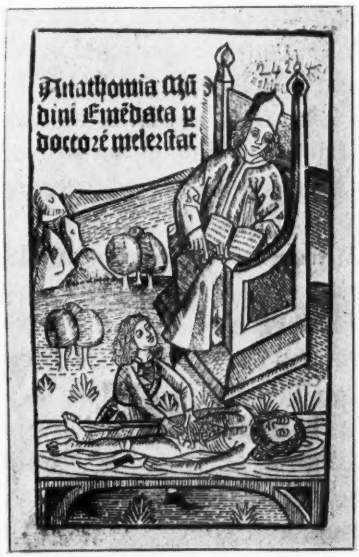

Fig. 1.—From the Melerstat edition of Mundinus (Leipzig, 1493).

Fig. 2.—Title page of the Mundinus by Berengarius (1521).

should be left to expert barbers and to the itinerant quacks who operate in public places. He, therefore, who desired to perform this manual operation in the best manner, will derive great advantage by frequenting men who are experts in performing it, and by seeing and impressing well on his memory their manner of operating."

We do, however, find among the writings of several of the Italian professors of medicine and surgery some description of dental diseases in their treatment.

Of these writers several names stand out brightly on the scroll of the history of dentistry.

Bruno of Longobucco (1252).

Lanfranchi (1300) who recommended the use of narcotics and was not at all favorable to the extraction of teeth.

Theodorico Borgognoni (1205-1298) advised that in every case where a fistula of the gums exists, or in general of the maxillary region, special attention should be paid to the condition of the dental roots.

The title of "doctor" was first used in the twelfth century, at the establishment of the universities, and indicated a learned man in any science. The term "doctor of medicine" was first applied to William Gordini in 1329, by the college at Asti, in Italy. It was not until 1622, however, that "surgeon-dentist" was bestowed, a number of men in France, notably Gillies, receiving the title during that year.

Anatomy was advanced by *Remondino* or *Mindino de 'Luzzi* called *Mundinus*, whose *Anatomia* was completed in 1316 and first published in Padua in 1478. This treatise, "*Anatome omnium humani corpus interiorum membrorum*," was the first treatise founded on the actual anatomy of the human body, having this advantage over the works of Galen, who had very little, if any, practice in human dissection, doing most of it on apes.

This work was brought out during the fourteenth century, passing through many editions in Bologna, Leipzig, Venice, Strassburg, Lyons, Pavia, and Marbourg, and has been esteemed as classical literature in Italy, where it was used for a long time as a text-book. It has also the distinction of being the first anatomical work in which wood engravings were used as illustrations. From this period on every university adopted the habit of dissecting one or two human subjects every year, a barber being generally charged with this operation while a professor demonstrated the several organs from the work of Mundinus.

Guy de Chauliac (1300-1370) was the most celebrated surgeon of the fourteenth century. His work on surgery, "*Inventarium sive Collectorium partis Chirurgicalia Medicinæ*", obtained as great a degree of fame in France, as did that of Mundinus in Italy, and which, even up to the eighteenth century, "was, as it were, the official code for teaching of surgery." It was a clear explanation of much confused matter, which had been written by his predecessors in the dark ages, and "caused Fallopius to speak of Chauliac as the first legislator in surgery, as was Hippocrates in medicine."

From de Chauliac's work we obtain a clear and concise idea of the condition of dentistry during the fourteenth century. We find that this branch made but little progress from the time of the Arabians to that of Guy de Chauliac, over two and a half centuries; and even this great surgeon contributed little worthy of note to the development of dentistry. On the anatomy and physiology of the teeth he expresses himself very briefly. In regard to the pathology and therapy of the teeth his ideas are the same as the Arabian writers. The chapter on the extraction of teeth is simply a summary of what Albucasis wrote.

"The Arabian surgeons treated rather lengthily the deformities of the dental arches, and the methods employed in correcting these. Guy de Chauliac almost entirely neglects this subject and limits himself to saying that if any tooth becomes abnormally lengthened, it is necessary to reduce it to the right length with the file, but operating 'wisely' so as not to loosen it."

Pietro de Argelata of Bologna (1433) in his treatise on surgery, in six books, writes along similar lines, and also recommends the use of strong acids for cleaning carious cavities of the teeth.

Giovanni Plateario (1470), Professor at Pisa, recommends the sitting posture as the most convenient for the patient during the operation, evidently an innovation.

The last writer of this period to be mentioned is worthy of note—*Giovanni Arcolani*, professor at Pauda and Bologna (died 1484). *Practica*, his treatise on surgery, is memorable as one of the leading pioneers of dentistry and surgery of the mouth. His work contains many illustrations of instruments used at the time. He wrote at length and with originality on the subject of teeth, recommending the use of thin gold leaf for filling carious cavities, first cleaning the cavity with a strong acid. This is the greatest advance thus far towards conservative dentistry, although he himself was not the first to use this method.

Sixteenth Century.

Not until the sixteenth century do we see any great progress made in dentistry. During this period we find the revival of the arts and sciences,

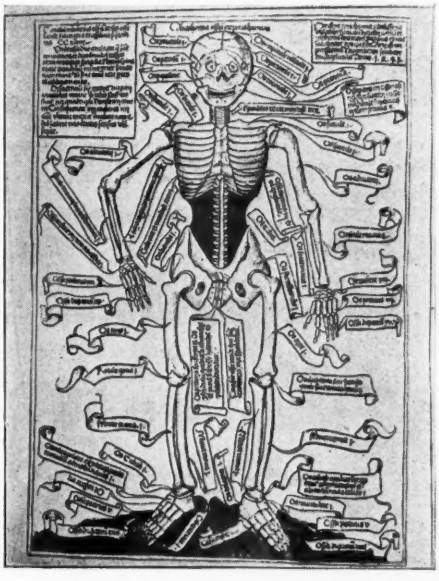

Fig. 3.—Conception of anatomy. R. Helain (1493).

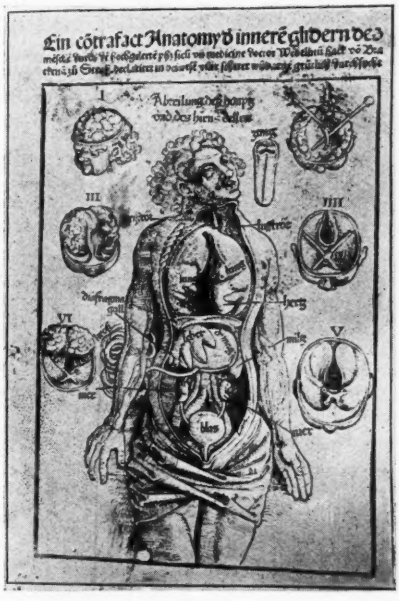

Fig. 4.—Anatomical sketches from Phryesen's Spiegel der Artzney (1517).

the translation of the early Greek works into Latin, and the great improvement in printing by means of movable letters. All this had a well defined bearing on the advancement of medicine and dentistry.

The greatest progress, however, was made in anatomy. Every part of the human body was carefully studied and many important ideas were revealed, contributing to the establishing of the science of medicine.

Among the great physicians of this period, and important additions to medicine, we find the following:

Gabriel de Zerbi (1502) was the first to describe the uvea of the eye; the first pair of cerebral nerves; and the fallopian tubes.

Achillinus (1516) gave the first correct description of the valves of the cecum; the whartonian ducts of the submaxillary glands; two of the small

bones of the ear, the malleus and the incus; the veins of the arm; the infundibulum of the brain; the fourth pair of cerebral nerves; and the vermiform appendix of the cecum.

Berenger de Carpi (1518) is supposed to have dissected over one hundred bodies. In his works he describes the separate cartilages of the larynx; the tricuspid valves between the right auricle and ventricle of the heart; and the semilunar valves at the commencement of the pulmonary artery.

Nicholas Masson (1536) showed the peritoneum to be a closed sac and formed one continuous membrane.

Charles Etiene (1536) described the distinction between the penumogastric and sympathetic nerves, the valves of the veins; the three branches


Artzney Buch-
lein/wider allerlei kran-
cheyten vnd gebrechen der tzeen/gezogen
auſs dem Galeno/Auicenna/Meſue/
Cornelio Celſo vnd andern mehr
der Artzney Doctorn/ſeher
nützlich zu
leſen.
M. D. XXX.

Fig. 5.—Title page of Zahnarzneybuchlein. First work pertaining to the care of the teeth. Dr. E. C. Kirk's edition.

of the fifth of cerebral nerves; and the canal of the spinal cord along its entire course.

James Sylvius; Jacques Dubois (1540) was the master of Vesalius and one of the earliest known anatomists of France. He was the first to inject the blood vessels, to describe the pterygoid and clinoid processes of the sphenoid bone and the transverse and oblique processes of the vertebræ, the externus oblique and transversalis of the abdomen muscles, and the external jugular veins.

Ambroise Paré (1543) was the greatest surgeon of the century. He introduced into France the application of ligatures to arteries for the purpose of arresting hemorrhages.

Ingrassius (1544) described the two tympanic foramina; the tympanic portion of the Vidian nerve "Chorda tympani;" and the mastoid cells, as forming part of the ear, the cochlea and the semicircular canals.

Michael Servetus (1546) was the first to comprehend the lesser circulation, that which passes through the lungs.

Faliopius (1561) first described the aqueduct of Fallopius, containing the chorda tympani, the labyrinth and tympanum; several muscles of the neck; the occipito-frontalis, the external pterygoid, geniohyoideus, and all the muscles between the hyoid and the lower jaw.

Vidus Vidius (1561) demonstrated the aqueduct of Sylvius; Vidian canal and Vidian nerve.

Eustachius (1563) described the structure of the teeth, the Eustachian tube of the tympanum; the thoracic duct; the Eustachian valve between the openings of the superior and inferior vena cavæ.

Until the year 1530 medicine and dentistry were included under one head. According to Crowley's "Bibliography" it was not until 1536 that we find the first publication in dentistry. During that year the work entitled "*Zahnarzney*" appeared, being published in Frankfort, Germany, but without the author's name. As far as known the earliest work pertaining to the study and care of the teeth, is the edition by Michael Blum "*Artzney Buchlein*", published in Leipzig in 1530, and now in the library of Dr. E. C. Kirk.

In 1536 the first edition by Charles Egenloff was issued. This work is perhaps most interesting to us, as it contains several paragraphs dealing with the treatment and correction of irregularities of the teeth.

The unknown author of this little work says, "It often happens to children more than seven years of age, when the teeth begin to drop out; that other teeth grow by the side of those which loosen the tooth about fallen out from the gums, and move it often to and fro until it can be taken out and then pushed the new one every day on towards the place where the first one was until it sits there and fits in among the others, for if you neglect to attend to this, the old teeth will remain, turn black, and the young one will be impeded from growing straight, and can not more be pushed to its right place." We are lead to believe by this statement that the mechanical principles of regulating appliances were not known at that time.

Later, in 1559, a book "Zahn Artzeni"[1] (tooth doctoring) was also published in Germany, but the author's name is not given. It is in text so much like the one published by Peter Jordon, in 1532, that it may have been a second edition of Jordon's book. It contains many curious observations.

"It frequently happens that when, in the seventh year, the teeth of children begin to drop out, the new teeth grow alongside of those that should fall out. In such a case the old tooth should be well separated from the gum and frequently shaken until it becomes loose enough to remove. After that the new tooth should be daily pressed in the direction of the tooth that has been removed until it has taken the place formerly occupied by the other one, and if this is neglected the tooth will become black, and it can never grow straight, and there is no way by which it can be put in its proper place afterwards."

1. Koch's History of Dental Surgery, Vol. 1, p. 23.

To *Walter Herman Ryff* (1548) honor must be given for the first important work devoted to dentistry. "*Nuetzlicher Bericht, wie man die Augen und das Gesicht, scherfen und gesund erhalten, die Zahne frisch und fest erhalten soll.*" (Useful instruction on the way to keep healthy, to straighten and reinvigorate the eyes and the sight, keeping the teeth clean and retaining them.)

There was little original material in it, the principal merit consists in the fact that it was the first book that was written in German and not in Latin, and may be looked upon as the earliest work endeavoring to impart to the people knowledge of medicine, dentistry, and hygiene.

The pamphlet, printed in Wurzburg, is made up of sixty-one pages, and is divided into three parts, the first of which is dedicated to the eyes, the second to the teeth, and the third to first dentition.

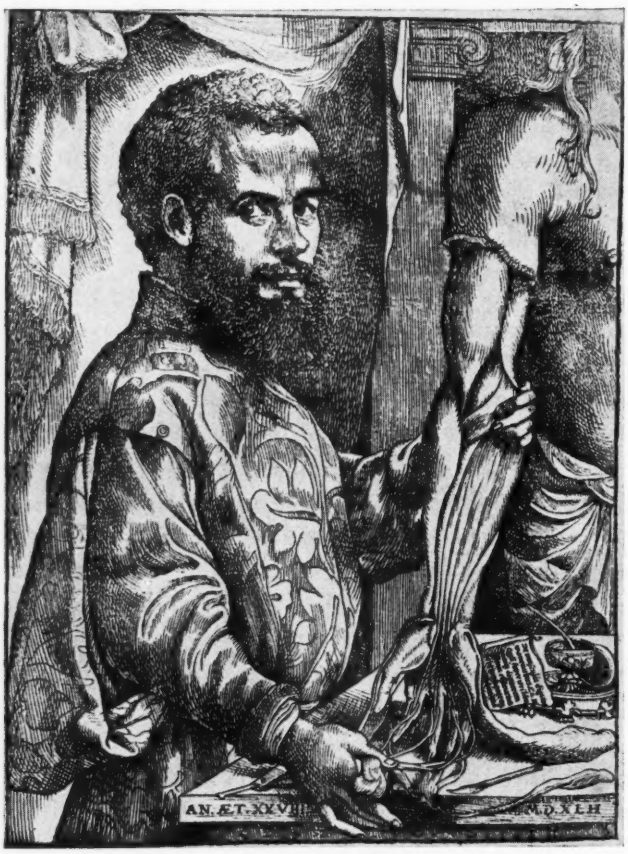

Fig. 6.—Andreas Vesalius (1514-1564).

Andreas Vesalius (Brussels, 1514) came from a family of physicians. Making rapid progress in medical science, he soon became professor of anatomy at Padua, and by skillful work with the dissecting knife and keen perception he brought forth his remarkable work on human anatomy, "*De Corporis Humani*" (1543), the first comprehensive and systematic description of the human body. In this work we find the first plates and beautiful illustrations executed from nature.

His system of anatomy is not complete, nor is it accurate, but must be

considered wonderful, when we consider the conditions under which it was accomplished. He describes the osseous system; was the first to discover the internal pterygoid; the vocal chords of the larynx; the glandular structure of the stomach; the coronary arteries of the heart, as well as several other arteries; the cervical and sacral plexuses of nerves.

On the fly leaf of a copy of Vesalius' work, formerly in the library of Dr. William Osler, but now in the New York Academy of Medicine, Dr. Osler has written: "The greatest medical book ever printed, from which modern medicine dates."

"Although he gave little attention to dental matters, Vesalius fully deserves a place of honor in the history of dentistry, for this, like every other branch of medicine, received great advantage from his reforming work which broke forever the authority of Galen, thus freeing the minds of medical men from an enslavement which made every real progress impossible."

Fig. 7.—Title page, Anatomy of Vesalius.

"Before Vesalius, Galen's anatomy had served as a constant basis for the teaching of this science." In his great work, beautifully illustrated, the anatomy of the teeth is treated with less consideration than that of the other parts of the body. However, his description of the dental art is far more accurate than that of Galen. In his chapter on the anatomy of the teeth appear several well drawn figures, one showing the section of the lower molar, with the pulp cavity and the two root canals; another the upper and lower teeth of the right side, in occlusion, showing clearly the general shape, and length and number of roots.

"In regard to roots, he makes, for the first time, a very clear distinction between the premolars (small molars) next to the canine and the other three, and says that the former in the upper jaw usually have two roots, and in the lower, only one; whilst the last three upper molars usually have three roots and the lower ones two.

"The canines are, of all the teeth, those which have the longest roots. The middle upper incisors are larger and broader than the lateral ones, and their roots are longer. The roots of the last molars are smaller than those of the two preceding molars. The molars are not always five in each half jaw; sometimes there are only four either on each side, or one side only, in only one jaw or in both. Such differences generally depend on the last molar, which does not always appear externally, remaining sometimes completely hidden in the maxillary bone, or only just piercing with some of its cusps the thin plate of the bone which covers it."

Gabriel Fallopius (1562), another great physician of the period, did not however limit his investigations to anatomy and surgery, but also to plants and animals. He was better acquainted with the ear than any of his predecessors, and, as previously noted, was the first to describe the aqueduct of Fallopius containing the chorda tympani; the labyrinth and tympanum; and several muscles around the head and neck. "He carried out accurate and successful research in regard to the development of the teeth. His investigations enable him to show the falsity of the opinion held by Vesalius, that the permanent teeth are developed from the roots of the temporary ones. He was, besides, the first who spoke in clear terms of the dental follicles."

The teeth, says Fallopius, "are generated twice over, that is, the first time in the uterus, after the formation of the jaws, and the second time in extra-uterine life, before the seventh year. The first teeth are, at the time of birth, still imperfect, without roots, completely enclosed in their alveoli, and formed of two different substances; the part with which they must break their way out is osseous and hollowed, the deeper part, instead, is soft and humid and is seen covered with a thin pellicle, a thing which may also be observed in the feathers of birds when they are still tender. In fact the part of the feather which comes out of the skin is hard and corneous, while the part which is embedded in the wings is soft and humid and has the appearance of coagulated blood or mucus. So also in the fetal teeth, the part corresponding to the future root presents itself like coagulated mucus. Little by little this soft substance hardens and becomes osseous, thus constituting the root of the teeth."

Fallopius' reference to the analogy between the development of the teeth and that of feathers was highly important, as a point of departure for embryological researches which showed clearly the real nature of teeth, thus destroying the mistaken idea held by Galen and many other authors that these organs were bones.

On coming to speak of the teeth generated in extra-uterine life, that is of the permanent teeth, Fallopius relates having observed that they have their origin in the following manner: "A membranous follicle is formed inside the bone furnished with two apices, one posterior (that is to say, deeper down, more distant from the surface of the gums), to which is joined a small nerve, a small artery, and a small vein; the other anterior (that is, more superficial) which terminates in a filament or small string like a tail. This string reaches to the gum, passing through a very narrow aperture in the bone, by the side of the tooth which is to be substituted by the new one. Inside the follicle is formed a special white and tenacious substance, and from this the tooth itself, which at first is osseous only in the part nearest the sur-

face, whilst the deeper part is still soft, that is, formed of the above mentioned substance. Each tooth comes out traversing and widening the narrow aperture through which the 'tail' of the follicle passes. The latter breaks, and the tooth comes out of the gum, bare and hard; and in process of time, the formation of its deeper part is completed."

Bartholomeus Eustachius (1547), another great anatomist, spent considerable time studying the teeth, giving a full description of the different forms, numbers and varieties, indicating manner of articulation and the nature of the attachment of the teeth to their sockets.

In his monograph "*Libellus de Dentibus*" published in 1563 in Venice, we find the first treatise ever written on the anatomy of the teeth. Eustachius treats with great accuracy all that concerns the anatomy, physiology and development of the teeth.

"In Chapter IV, speaking of the means by which the teeth are held in their sockets, Eustachius mentions in quite explicit terms the ligaments of


BARTHOLOMAEI
EVSTACHII
SANCTOSEVERINATIS
LIBELLVS DE
DENTIBVS.
Cum priuilegijs.
VENETIIS,
M D LXIII.

Fig. 8.—Title page of the edition of Eustachius. First work on dental histology (1563).

the teeth. He begins by saying that the perfect correspondence between the dental roots and the alveoli, both in shape and in size, is one of the elements which contribute to the firmness of the teeth, since the alveolus, being exactly applied, on all sides, to the root or roots of the teeth, cause the latter, by this simple fact, to be fixed in a determined position.

Ambroise Paré (1510-1590), the celebrated French surgeon, in his several works treats very thoroughly of the diseases of the teeth, and their cure. At the age of sixteen, we find him in Paris employed as a barber. Under these conditions he was able to acquire a vast experience in the practice of dentistry. In his writings he gives a fairly correct account of the teeth; their number, position and size; of their attachment to and connection with adjoining structures.

His anatomy is vague, and not nearly as exact as Vesalius or Eustachius. He, like some of his predecessors, believed that the teeth continued to grow until death, and that the wearing away was due to friction in mastication.

"In speaking of the development of the teeth, Ambroise Paré says only that "they are already solid and osseous before birth, he himself having observed this in dissecting the jaws of a child that had died immediately after birth."

"Toothache," says Paré, "is, of all others, the most atrocious pain that can torment man without being followed by death. It depends, in many cases, on a humorous fluxion of a hot or cold nature which flows into the alveolus, forcing the tooth outward, loosening it, and causing the patient so much pain on the slightest pressure being exercised upon it that he cannot dare to bite with it in the least. If, however, the tooth is corroded, hallowed out, or pierced to the root, the pain is so strong, when the patient drinks,

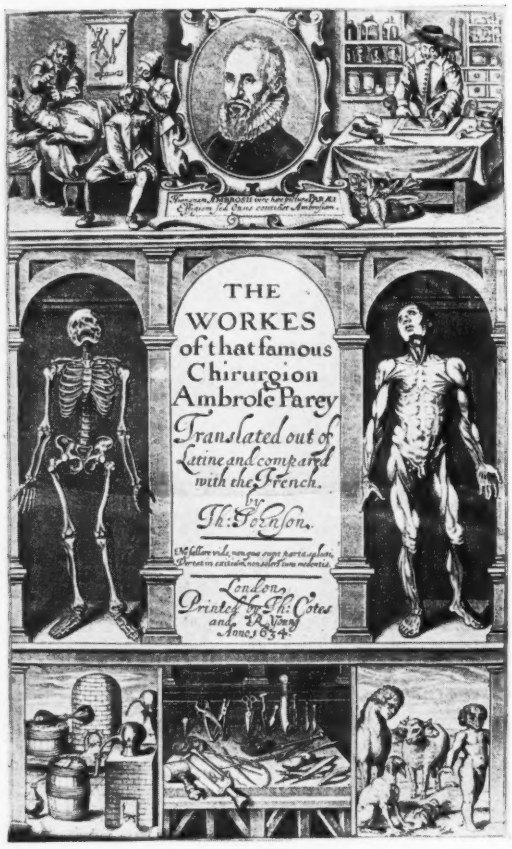

Fig. 9.—Title page of Ambroise Pare.

particularly if the liquid is cold, that he seems to have had a stab with a stiletto inside the tooth.

"If the pain is acute and pungent, like that produced by needles being thrust into the diseased tooth; if the patient complains of a strong pulsation at the root of the tooth, and in the temples; if the application of cold remedies calms the pain, all these signs indicate that the cause of the evil is heat. Instead, the cause of the pain may be held to be cold when the patient complains of a great heaviness in the head, emits a quantity of saliva, and finds a relief in the application of hot remedies. In the treatment of toothache one must fulfill the following three indications:

"1. Regulate fittingly the mode of living.

"2. Evacuate or dissipate the morbid humors; this may be effected by various means, namely, by purgatives, by bleeding, by gingival scarification, by the application of leeches on the site of the pain, by cupping on the back of the neck, or on the shoulders.

"3. Applying in each single case the medicaments best adapted for calming the pain.

"The extraction of a tooth should not be carried out with too much violence, as one risks producing luxation of the jaw or concussion of the brain and the eyes, or even bringing away a portion of the jaw together with the tooth (the author himself has observed this in several cases), not to speak of other serious accidents which may supervene, as, for example, fever, apostema, abundant hemorrhage, and even death."


COLOQVIO BREVE Y
cõpẽdioſo. Sobre la materia d la dẽ
tadura, y marauilloſa obra d la bo
ca. Cõ muchos remedios y aui
ſos neceſſarios. Y la ordẽ
de curar, y adreçar
los dientes.

¶Dirigido, al muy alto y muy pode
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ñor. Cõpueſto por el Bachiller Priſciſco
Martinez, Natural dela villa de Cattrillo
de oniclo. Eſtãte en Valladolid. 1557.
Con preuilegio.
¶Eſta taſſado en ℔ VII. mm.

Fig. 10.—Title page of F. Martinez (1557). Oldest Spanish work on dentistry.

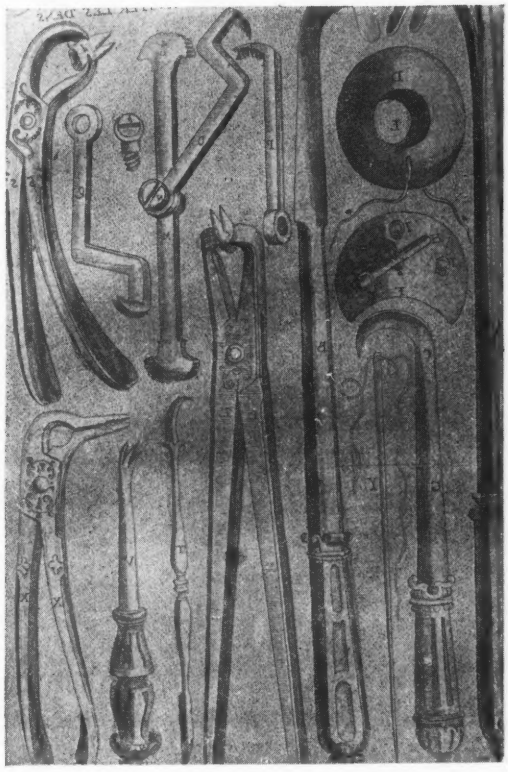

Fig. 11.—Type of instruments used in 1585. From the work of J. Guillemeau.

Paré was, perhaps, the first to mention the use of the palatal obturator. He says, "Sometimes a portion of the bone of the palate is destroyed by the shot of an arquebus, or some other wound or by a syphilitic ulcer, the patient being thereby disabled from properly pronouncing words and from making himself understood. To repair this defect we have found an expedient through the help and ministry of our art. It consists of the application of an instrument somewhat larger than the palatal perforation; this is made of gold or silver, of about the thickness of a crown (coin), and has the form of a vaulted roof to which a sponge is attached; when introduced into the aperture, the sponge, absorbing the humidity natural to such parts, will very

soon swell up, and thus the instrument is held firm. In this way words are better pronounced."

In case of difficult dentition, he advocates lancing of the gums, deeply, just above the tooth which is creating the disturbance, allowing the tooth to erupt easily.

In the correction of irregularities of the teeth, his method is similar to that of Celsus and others.

"If the persistence of a deciduous tooth should cause the cutting of a corresponding permanent tooth, outside the line of the dental arch, thus giving rise to deformity," Paré advises, "laying bare and then extracting the deciduous tooth; for after this the new tooth may be pressed towards the point before occupied by the other until it assumes its natural position."

He was undoubtedly one of the first to describe the process of trans-

Fig. 12.—Jacobi Horstii (1595). The story of the golden tooth.

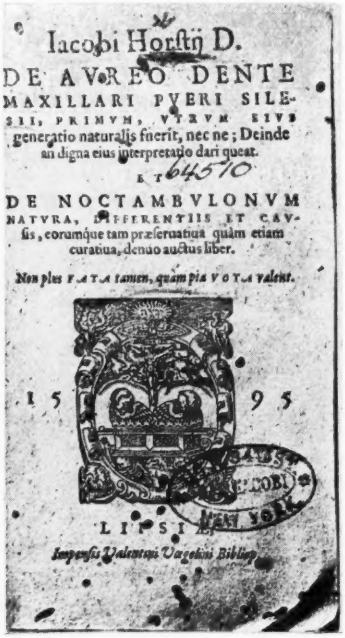

Fig. 13.—Title page of J. Horstii (1595).

plantation though not from personal knowledge, but from report, and he mentions a case in which this operation was said to have been successful. He also gives a minute direction for the extraction of teeth, and a chapter on "the placing of teeth artifically made instead of those that are lost or wanting." In this he says, "Teeth artifically made of bone or ivory may be put in the place of those that are wanting, and they must be joined fast unto another and also fastened to the natural teeth adjoining that are whole; and this must chiefly be done with a thread of gold or silver, or for want of either, with a common thread of silk or flax, as it is declared at large by Hippocrates." Thus it appears that no improvement upon the Etruscan and Phœnician plans were in his time known to this author. The process of transplanting mentioned by Paré was strenously advocated, more than two centuries later, by the distinguished physiologist, Hunter.

Fabricius of Aquapendente (1537-1619) follows the method of Celsus, advises great care in the extraction of teeth, and gives this method in correcting defects produced by irregularities: "When one or more teeth have appeared in an irregular position and offend the walls of the oral cavity or else the tongue, the excision (resection) of the tooth or teeth must be performed with a pair of strong pincers, whose shape must vary according to whether the teeth are situated externally or internally with regard to dental arches. But after the resection there will almost always remain some points or sharp irregularities, which by their presence would continue to irritate the soft parts, it will be necessary to remove these irritating prominences by means of a file."

In 1618 *Helkiah Crooke* published a curious and rare old work, "*Helkiah Crooke, Doctor in Physicke*", in which he reviews the work of the best anatomists, and indicates the character and extent of the physiological knowledge of his time. As to the teeth being bone he has the following to say: "That they (the teeth) are bones some men do deny, first, because bones are insensible, and teeth sensible. Secondly, because the bones have certain limits of action or increase, neither do they ever grow again if they perish, but in the teeth it is quite contrary. Thirdly, because they are harder than other bones. Fourthly, because bones exposed to the ayre do grow black, whereas the teeth do keepe their whitenesse..... Finally, say they, there is a stone that will consume fleshe, called therefore, Sarcophagus, which within forty days will devour the whole body except the teeth. If therefore the teeth were of the nature of bones, they also would be consumed.

"They are made very hard that they might not ware so soone or be broken in the chewing or breaking of hard things, for they are not lined either with fatte or gristles as other joynts are to hinder attrition. The teeth, therefore, do breake bones, resist the edge of steele, neyther can they easily as other parts of the body be burnt with fire. Hippocrates in his booke, '*de Carnibus*' ascribeth the cause of their hardness to the quality of the matter out of which they are ingendered, for he writeth that out of the bones of the head and the jaws there is an increase of a glutinous matter. In the glutinous matter the fatty part falleth downe into the sockets of the gums where it is dryed and burnt with the heate, so that the teeth are made harder than the bones because there is not cold remaining in them."

He paid close attention to dentition and the influence of the deciduous teeth in producing irregularities, referring to conditions produced by supernumeraries on one hand and narrow arches on the other. His views seemed to have influenced succeeding investigators. On second dentition the author says: "The shearing (that is, the incisors) teeth, when they do break forth, do thrust the first shearers out before them and issue betwixt the first two, and the second and the dog tooth this is next unto them. But if the former teeth will not fall or be pulled out or if the latter issue before the first fall then the latter make their way through new sockets and turn in the upper jaw outward, in the lower jaw inward, so that there seemed to arise a new row of teeth, and in this, indeed, hath deceived many historian and anatomists also." He then speaks of supernumerary teeth and their effects.

Matthais Gottfried Purmann (1648-1711), a celebrated surgeon of Breslau, was the first to mention models in connection with dentistry; these, however,

were taken in wax. Outside of the material used, he fails to mention just how they were taken. Therefore, to Phillip Pfaff, dentist to Fredrick the Great, nearly a century later (1756), we are indebted for the use of the important material, Plaster of Paris. The impression being taken in two sections, one on the right and the other on the left, which were united and a plaster model obtained.

Nuck, Anton (1650-1692), a Dutch surgeon and anatomist, devoted great attention to dental surgery and protheses. His conception of irregularities of the teeth are the same as those of other authors of the day.

"As to the use of the file, far from rejecting it entirely as does Martin, he holds it necessary in many cases for planing down points and sharp edges of broken teeth, as well as for removing at least, in a measure, the inconven-

Fig. 14.—Pierre Dionis (1718).

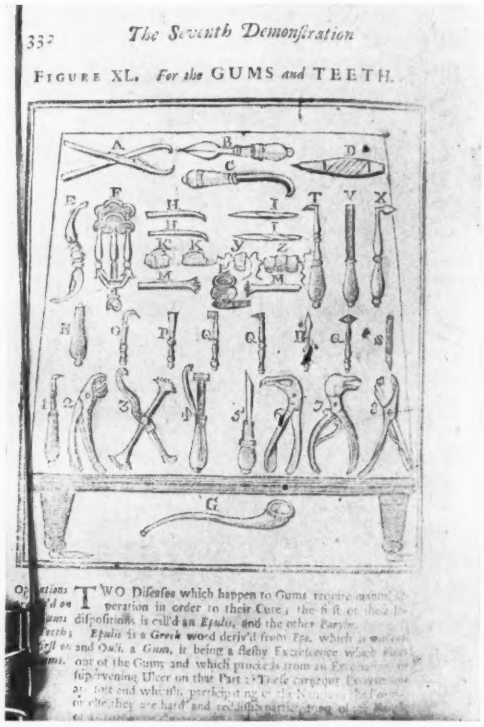

Fig. 15.—Instruments from Dionis' work.

ience and deformed appearance caused by irregular teeth. He says the file may be used without causing the slightest harm if one takes care not to approach the inner cavity of the tooth too nearly, and above all not to penetrate right to it, which would give rise to intolerable pain, such an accident he adds, may happen much more easily, when instead of using the file, whole pieces of teeth are removed with the excising forceps."[1]

Martin Benjamin (1679), "Apothecary to the Prince de Conde, was the author of a pamphlet[2] in which he gave a description of these organs and spoke briefly on their diseases. He shows himself decidedly opposed to the use of the file and to the application of false teeth, because according to him both of these things may be the cause of great harm. With regard to

1.—Nuck, A.: De ductu salivali novo, saliva, etc., 1690.
2.—Martin, B.: Dissertation s. les dents. Paris, 1679.

the file, he says that "nothing so easily tends to loosen the teeth as the use of this instrument, not to speak of various other conveniences, among which is the danger of opening the interior cavity of the tooth." This being the method then in vogue, his advice was a most timely one.

Pierre Dionis, a celebrated surgeon and anatomist of Paris, in his "*Anatomie de l'homme*" published in 1690, is perhaps the first to mention that there were those who practiced the science of dentistry alone, and gives the following advice:

"The teeth alone at present furnish the whole employment for several persons called operators for the teeth. It must be own'd that these Gentlemen, the sole object of whose labor are these parts only, may excell in their art, rather than the Chirurgeon, whose sicence is of infinite Extent; but yet he is not to neglect this part of Chirurgery in which he is to be acquainted that seven sorts of Operations are practis'd. The first is the opening or widening the Teeth when they are set too close together; the second to cleanse them when they are foul; the third, to hinder their rotting; the fourth, to stop the holes which grow in them; the fifth, is to file them when they are too long and jagged; the sixth, to pull them out when rotten, and the seventh to substitute artificial ones in the place of the natural."

"It is practic'd in three different cases, Viz: to separate them when they grow towards one another; to level them when some of them grow too long; to even and polish them when their points turn inwards, and grate against the Tongue, or grow jagged outwards and prick their Cheeks. On all these occasions we make use of the File V, provided with a handle that we may hold it the more steadily, it must be very fine so that it does not shake or loosen the Teeth, and tho' we don't make such hasty progress as we should with a coarse file, 'tis yet better to go on more slowly. The Operator is to sustain with one or two of his Fingers the Tooth on which he is working, to prevent its breaking or splintering whilst he is filing it. When the Operator is to separate the fore Teeth, he is to take care not to file one more than the other, that the spaces betwixt them may all be equal. 'Tis labor lost to file a too long tooth when that opposite it is wanting, at least unless we continue to do it from time to time, for 'twill continually shoot out beyond the rest, it being a certain truth, that the Teeth grow in order to repair their continual wasting by their mutual rubbing in Mastication; which Experience, proves in those who have had a tooth fallen out, for that against which it should rest, grows longer and shoots into the vacant space left by the lost Tooth. The Dentes Molares or Grinders have sometimes points as well as their Substance remains found and entire as when they come to putrefy, or when some part of them are splinter'd off. When these superfluous shootings out either prick the Cheeks, or grate the Tongue, they are to be filed off, in order to remove all sorts of roughness, and this is to be done gently, and with ordinary Care which is taken by those who follow this sort of practice."

In speaking of teeth growing outward; "They are to be drawn out, for the tooth which thus grows out of its rank very much incommodes the person to whom this misfortune happens, and occasions a deformity which shocks all who look on him. It doth not jet out very much beyond the other Teeth, the superfluous part may be fil'd or cut off with the Incisive Pincers,

but if the Table which ought to incline inwards is turned outwards, and the Tooth comes forwards, the Patient had better want a Tooth, than have one to disfigure him, wherefore 'tis to be drawn out with such instruments as the Operator shall think fit."

"When there grows a Supernumerary Tooth; for we very frequently find a Tooth jet outwards or inwards in the upper or under jaw, which is neither of the number of the rest of the Teeth, nor does it grow like them. Some people have several superfluous teeth, and others a double row, the Fortune tellers prognosticate a thousand Felicities to those to whom this happens, but for my part I take it to be an unhappiness to be often better stocked with Teeth than Victuals, to be pestered with too many Teeth, and be forced to suffer cruel pains to draw out this Natural Favor on which they are complimented."

"There are two questions which are canvassed with regard to the teeth, the first is, whether when we draw the milk teeth of children before they are inclined to fall of themselves they come again more beautiful and straight,

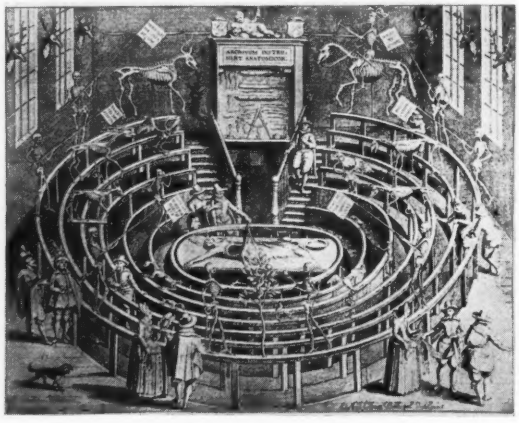

Fig. 16.—The Anatomical theatre in Leiden (1610).

and the other, whether a Tooth refixed in the Alveolus, after having been pull'd out may fasten and grow, as if it were not touched."

Expulsion of the First Teeth.

" 'Tis a mistake to believe, that the first teeth can give ill shape to the second, they are both of them form'd in little in the Alveoli, where they ossify. The first come out, after having served five or six years, are driven out by the latter which take their places and observe, that the first have only as it were a Table, because the others in their growth don't give time to the first to perfect themselves and to ossify at their roots, so that the old ones cannot spoil the shape of the new. I have found this by Experience in a young Girl, whose Mother caus'd all her sore Teeth besides one to be drawn, for the space of a Year before they ought to be expected to fall being full possess'd with an opinion that the succeeding growth would prove more perfect; but she was deceived, they proving worse than the former."

"Of the instruments us'd.

"The proper instruments for cleaning of the Teeth are contained in a case, because they are small, and being numerous they are screwed on the

same Handle (N), according as we have occasion to use them. There are several Figures, some are made like a shoeing horn (O), to go betwixt the Teeth, others like a Blade of a pair of Scissors (P), others like scrapers (QQQ), the third resembles a Graver, (R), and others a file (S), they are commonly of steel but those used to the King and the Princess are of Gold. And if there were yet a more precious Metal, we should employ it in their Service, because they reward us so magnificently." (See Fig. 15.)

Heister, Lorenz (1683-1758), of Frankfort-am-Main, one of the most celebrated surgeons of the eighteenth century, wrote a dissertation on Tooth-ache, *De Dentium dolore*, Altdorf, 1711, treating besides very extensively of dental affections and their cure in a masterly work on surgery,[1] published for the first time in 1718, and which went through numerous editions in various languages.

Fig. 17.—Lorenz Heister (1683-1758).

Movable prosthetic pieces are probably mentioned for the first time by this author. Although he is very concise in his manner of speaking of artificial teeth (this indicating that dental prosthesis was considered outside of the sphere of action of the general surgeon), nevertheless we learn from him that partial sets of teeth made of ivory or hippopotamos tusks, and without special appliances for fixing them, were then in use, which, when applied in the void between the neighboring teeth were maintained in position simply by their form. The author advises keeping prosthetic pieces very clean, removing them every evening before going to bed and not putting them back in the mouth until they have been well cleaned.

On the other hand, the author expresses himself in favor of the incision of the gums, in cases of difficult dentition. According to him convulsions and other nervous symptoms which children are subject to during the period of dentition depends wholly on the hardness and strained conditions of the

1. A General System of Surgery. Lorenz Heister, Chapt. LXXXI, 1743.

gums. It is, therefore, natural that the symptoms should disappear when an incision of the gums reaching to the tooth that is coming through, has caused the tension to cease.

"Sometimes the teeth stand more out or in than they ought, and sometimes, the sharp points of a broken tooth stand out unequal which not only

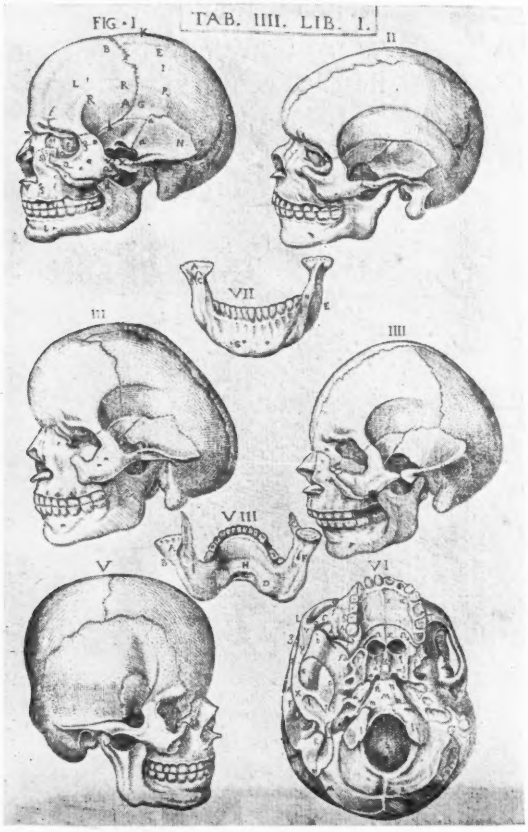

Fig. 18.—Skull.

impedes the mastication of food and formation of the voice, but frequently lacerates the tongue, lips and cheek; to remedy this disorder it will be necessary to file away the inequality with instruments or when that is impractical, to extract."

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EDITORIALS

Co-operation Between the Dentist and the Orthodontist.

IF the dentists and orthodontists are to render the greatest possible service to the public, there must necessarily be co-operation between the two. The necessity for this co-operation is apparent to every one connected with these two professions, but in times past there has not been the close relation existing between the orthodontist and dentist that there should have been. There have been several reasons for the differences which have existed between the two groups, whose work is very closely related and whose success is often interdependent.

It is the dental practitioner who first observes cases of malocclusion. In fact, the general practitioner who has reached the point of being a "family dentist" will be in a position to first observe malocclusions that develop in young children. If he is desirous of doing the greatest service for patients who may require orthodontia treatment, he should have a consulting acquaintance with some competent orthodontist to whom he can refer his patients at the proper time, so that they may be treated with the least trouble to the patients and obtain the best results in the shortest time conditions will permit. There are, however, some dentists who refuse to follow this plan, and we have even known of men who, when they found malocclusion in the mouths of their patients, would not refer them to an orthodontist for several

reasons, the principal reason being that they take a purely mercenary view of the situation. Some have argued, "Why should I send this case to the orthodontist, or why should I send to some one else what I cannot do myself?" In other words, the dentist is not capable of correcting the malocclusion, yet he would allow the defect to remain rather than refer it to one who could probably treat it. This question of financial consideration has often been the bone of contention—whether orthodontists should pay commissions to general practitioners. As we do not desire to discuss this phase of the question at this time, we will simply state that the man whose perspective of malocclusions in cases of his patients is from the financial standpoint will not necessarily work for the best interests of his patients.

Other instances where co-operation between orthodontists and dentists is very beneficial to the patient are in those cases in which malocclusions are occurring or may be produced because of prolonged retention or early loss of the deciduous teeth. We have seen a great many cases of malocclusion produced by the early extraction of deciduous teeth, which could have been avoided if the dentist had consulted an orthodontist who was familiar with the manner in which malocclusions develop. We have also seen malocclusions grow from a minor defect to a serious condition simply because improper advice was given by the dentist, such advice often being for the patient to "wait awhile and the case will correct itself." If, therefore, an orthodontist were consulted in cases of malocclusion, in many cases in which his line of work qualifies him to understand the conditions better than are known to the general practitioner a greater amount of good would be accomplished for the patient, and, in fact, for humanity.

We must not blame the general practitioner or the dentist entirely for this lack of co-operation, for we are aware that there are many men practicing orthodontia who do not desire to be called into consultation with the general dentist unless there is a fee involved. Some orthodontists positively refuse to give advice in regard to the treatment of a case unless they can immediately obtain a fee. The orthodontist who takes this narrow view of life is certainly not disposed to benefit the community, or elevate his profession, and in a short time will find that a man with a broader view will gain his practice.

There is also an attitude assumed by orthodontists that they occupy a superior plane to that of the dentist—or, in other words, belong to a selected group—and do not care to communicate, advise, or consult with a dentist in regard to any case. We have also known of strained relations to occur between orthodontist and dentist after the dentist has referred a case to an orthodontist. The orthodontist often assumes entire charge of a patient, and does not to any extent consult the family dentist. We do not consider it advisable for the family dentist to attempt to advise the orthodontist how a malocclusion should be treated, but we feel that the orthodontist should show some consideration to the general practitioner in regard to fillings, bridge work, etc. We have known cases where general practitioners sent patients to a certain orthodontist, and this orthodontist referred the patients to another practitioner because the second practitioner was the orthodontist's personal friend. This is very unfortunate, for, if there is to be co-operation between the orthodontists and dentists, the patient referred to the ortho-

dontist should certainly be sent back to the man who referred him and not to someone else. We often find that an orthodontist objects to referring a patient back to the dentist on the grounds that the dentist in question does not do the character of dental work deemed necessary by the orthodontist after the malocclusion is treated. We are aware that many a case of malocclusion will be either a success or a failure, depending on the kind of dental work subsequently done, and there should be co-operation between the orthodontist and dentist in restorations. While the orthodontist is not supposed to know all about dental restoration, he should know something about the forces of occlusion and what must be done in order to treat the case successfully. The dentist who, therefore, fails to avail himself, in making artificial restoration and in building crowns, bridges, or inlays, of the knowledge which the orthodontist possesses regarding the laws of occlusion, will undoubtedly not render the greatest possible benefit to his patients. The dentist should be willing to observe the procedure by which the orthodontist desires restoration to be made so as to make the occlusion of the teeth self-retentive, and not advance the argument that because the man is an orthodontist he knows nothing about dentistry. The orthodontist is also in the wrong at times by failing to realize that the dentist is not familiar with cases of occlusion or the manner in which such casess should be treated. Then again, very often the family history of a case and idiosyncrasies of the patient, which are known to the dentist, would be of greater assistance to the orthodontist if he knew them.

In conclusion we will say that the most intimate the relation concerning the consultation between the general dental practitioner and the orthodontist, the better it will be for the dental profession and the general public.

Bands vs. Ligature.

THE use of the wire ligature as introduced by Dr. Angle several years ago is very well understood by all men who have devoted sufficient time to the practice of orthodontia. During the last few years, and especially the last few months, there has appeared in dental literature a number of articles in which it is claimed that a band as a means of attaching the malposed tooth to the regulating appliance is superior to the ligature. There are at least three different appliances recommended for orthodontia purposes whose employment requires the use of the band in preference to the ligature. In fact, these three appliances, as made by their inventors or designers, could not be used with the wire ligature. Those men who are using any of these three types of appliances have been very emphatic in condemning the wire ligature and attributing a great many faults to the ligature. We are willing to admit that the use of the wire ligature, as used by some men, has been productive of a great amount of injury. We are at the same time unable to realize how it would be possible for a band, if used in such a crude manner as the wire ligature has been employed by some, to cause less injury. We believe that the band, in the hands of those men who produce injury with the wire ligature, will cause even more harm than the ligature. Anyone who is familiar with dental anatomy, the proper shape of the tooth, and the histological

structure of the peridental membrane and gum tissue will agree that there is a small free space gingivally to the proximal contact point of the tooth, and occlusally to the proximal gum tissue, which will admit the passage of a wire ligature without injuring the surrounding tissue or separating the teeth. Some have claimed that the use of the wire has induced decay, but in our practice we have never seen the decay of a tooth caused by the use of a wire ligature. Such wire ligatures as have been used have possessed antiseptic properties far superior to anything that can be obtained in the use of bands, which are generally made out of noble metals. If the wire ligatures are too far gingivally or too far occlusally, it will produce harm in two ways. The ligature that is too far gingivally will necessarily sever the fibers of the peridental membrane, which holds the proximal gum tissue in apposition to the tooth and also holds the free margin of the gum in contact with the gingival ridge. A wire ligature too far occlusally will eventually separate the teeth, producing space between the approximal contact points. Either one of these two conditions is undesirable, and both can be avoided. We may say with equal force that with the use of bands either one of these conditions can be very readily produced, and, in fact, it is almost impossible not to produce one of them. We have for many years spoken of the disadvantages of the use of the bands, as they produce space between the teeth at the approximal contact points, and thereby destroy one of the forces of retention. With the use of bands on teeth we have often seen cases where, after the teeth were moved to the so-called proper position with the line of occlusion, spaces existed between all of those teeth, and these spaces have to be closed. It is during the closure of these spaces that a great many of them relapse, and the proximal contact points slip past each other, starting the teeth again toward malocclusion. We are aware that enthusiastic users of bands on all the malposed teeth claim the bands can be made so carefully, so accurately adjusted, and so fitted in the proximal spaces that they would fit in the proximal space gingivally to the proximal contact point, and not interfere with the free margin of the gum. Admitting this can be done, we must also admit that the band on the mesial and distal sides of the tooth must be so extremely narrow and thin that it will very easily be torn or displaced with a slight amount of force. We have seen a great number of appliances placed on teeth where the malposed tooth has been attached to the regulating appliance by means of a band, and the work has been very beautiful from a mechanical standpoint. So far as efficiency is concerned, there is no question that the appliances which depend on the use of the band will move the teeth, but we do not believe they will move them any better than the appliance which depends on the ligature.

So far as the esthetic phase and the welfare of the patient are concerned, bands placed on all the anterior teeth certainly present a display which is very displeasing. We have known of several strong objections being raised by patients because of the appearance of the appliance when bands are used on all the anterior teeth, and have known of patients who have even refused to have the malocclusion treated because of the appearance of such an appliance. While some men may be able to convince their patients that they should wear any kind of appliance, regardless of its appearance, there are a few patients who will not permit such a course of treatment. Taking all of

these points into consideration, we believe that, in the hands of a skillful man, one who understands the shape of the tooth, the gum attachment, and the proper position for the wire ligature, and the application of the appliance so it will not move up and down to displace the ligature, such an appliance is much more esthetic than one in which the band is used. Admitting that the wire ligature has some disadvantages and that the use of the labial arch also presents a bad appearance, the only way to avoid this condition is to use the lingual arch, as has been suggested by Dr. Lourie and others the last few years. In regard to the use of the lingual arch as a means of avoiding the use of either bands or ligature, we will have more to say later.

The Teaching of Orthodontia in Dental Colleges.

WITH the change to a four-year course in dental schools it becomes necessary that the instruction be changed and that certain branches be added to the course, and that a greater length of time be devoted to other subjects. One of those subjects which has received a great deal of consideration is orthodontia, and it is well that such should be the case. It can be said with reason that no branch in the dental colleges has, as a whole, been more neglected than orthodontia, or has been so poorly taught. There is also justification in the statement that there is no other branch in dentistry which requires as much painstaking effort and no other branch which presents as many peculiar features as does orthodontia. It is fair to concede that at the present time the subject is not being taught exactly alike in any two schools in the country. This conclusion is reached because the men teaching orthodontia have, as a rule, been gathered from the ranks of the dental profession, and a great many of them have begun teaching orthodontia without any special training or instruction on the subject. In a great many cases certain men have been selected to fill the chair of orthodontia because no one else desired to take the position. This is not the case now to the same extent it was a few years ago, for at present probably fifty per cent of the schools have a chair on orthodontia filled by some man who has taken special instruction in the science, and who has devoted sufficient time studying that branch. But we can well remember when the chair of orthodontia was given to anyone who would accept it, and even at the present time, in some colleges, the board of control, or the "powers that be," do not attach enough importance to the subject of orthodontia to give it the dignity of a special chair and establish a professorship on that subject. There are a number of schools where orthodontia is still in the department of prosthetic dentistry or operative dentistry, and a few lectures are given by the man who teaches dentistry, or it is turned over to some assistant. Such a condition seems to be almost unbelievable when one considers that orthodontia is the only branch of dentistry which can be practiced as a separate profession without overlapping some phase of dentistry. It is the only branch of dentistry which is dignified by established schools giving special instruction in that particular line, and there are more men practicing orthodontia as a specialty than are practicing any other branch of dentistry as a specialty. This being true, it certainly seems that dental colleges should be awakened to the op-

portunity and the necessity of providing chairs of orthodontia filled by men qualified to teach the subject, and not be content to have orthodontia taught by anyone who will take the chair, regardless of that persons' training. Even in the majority of the schools the plan of instruction which has been followed in the years past has not been productive of any great amount of good.

A number of schools demand that each student shall treat a case of malocclusion during his junior or senior year, and in some schools during both years. Some schools also require that the student make a large number of appliances, going through a series of technical work in the manufacture of such appliances, which is supposed to fit him for the practice of orthodontia. It is just as absurd to imagine that technical instruction in appliance making—the cutting of threads and screws, the making of clamp bands, instruction in making arches by cutting the threads and making the nuts—will fit a man for the practice of orthodontia as it would be to imagine that instruction in the making of the plugger points would enable a student to insert a gold filling, or that the making of an excavator would give him the ability to prepare a cavity. The practice of orthodontia and the construction of appliances are two different matters. Of course, it is necessary that an orthodontist know something about the construction of appliances, but it certainly does not qualify him to practice the science by being compelled to go through a long series of technical appliance making, when the appliance can be bought from the appliance maker much more cheaply and much more accurately constructed than he, making only a few, can construct them. Also, the plan of having the dental student treat a case of malocclusion during his college years is very defective, because it has been proven that orthodontia cannot be successfully practiced in connection with general dentistry, and it is equally true that orthodontia cases cannot be successfully treated in connection with other clinical work. While every dental student should study orthodontia in dental colleges, to our mind it is just as absurd to expect every student to treat a case of malocclusion as it is to expect every medical student who studies surgery to perform a major surgical operation while he is a medical student. The performance of major surgical operations by medical students would not, of course, be permitted, but nevertheless some dental colleges expect students to perform operations equally as difficult, from a dental standpoint, during their student career. The result of having the dental students treat these clinical cases during their college years is, generally, to discourage the dental students from engaging in the practice of orthodontia, because very few students are able to complete their case during the year, and in a great many instances one student "inherits" a case from the class before him. These cases are dragged along from one school year to another, very little is accomplished in the way of successful treatment, the patient becomes discouraged, the student becomes discouraged, and orthodontia, as a profession, receives a bad name.

It is our belief, based on several years' observation, that the best success can be obained in the teaching of orthodontia by having that branch supervised by some one who has taken special work on the subject, who is making orthodontia his life work, and who is devoting his entire time to the practice of the science. It necessarily follows that the man who teaches orthodontia

in the dental colleges should be one who has had some training along that line. The details which should be taught include the basic subjects, such as the occlusion of the teeth, the forces of occlusion, classification of malocclusion, principles of malocclusion, and the possibilities of treatment. If a technical course is pursued, it should be a course which would include only such details as the practitioner of orthodontia is called on to perform in his line of work. That would include the taking of impressions and the making of the models, and the making of a few plain bands. The taking of an orthodontic impression certainly would be a great training in any branch of dentistry.

It is necessary that the dental student should know the possibilities of orthodontia—know something about the appliances and the construction and application of appliances—but we believe he can learn that best by seeing those appliances constructed and applied by some one who does it skillfully. He will also have a better knowledge of the practical side of orthodontia, and the possibilities of treatment by seeing cases treated by some one who is skilled in their treatment. Malocclusion should be treated in dental colleges, but the orthodontic clinic should be conducted like the nose and throat clinic, or any other clinics in the medical schools. The professor or assistant instructor in that branch should treat cases himself. A room should be provided in the dental college for orthodontic work, the class should be divided into sections, probably of ten or twelve, and each section should be compelled to attend the orthodontic clinic at a certain time and for a definite period. If the classes are too large, so that one man could not give them proper instruction, there should be a sufficient number of assistant professors to have charge of a certain number of cases, in order that all of the class could see practical treatment of malocclusions demonstrated by some one who is experienced in that subject. The members of each class would then know the possibilities of orthodontic treatment, they would understand the causes and results, and the patient would receive corresponding benefit, which in not always the case where the malocclusion is treated by dental students. We are aware that this plan of instruction would mean the addition of a certain amount of space and equipment to conduct this clinic, but the orthodontic clinic should be conducted in a separate room, the same as the oral surgical clinic is conducted in some dental colleges. When this plan is followed, the dental student will have as much respect for orthodontia as the medical student has for surgery, and the greatest advances will be made in the treatment of malocclusions. A practical knowledge of the subject will then be acquired, which has been the exception rather than the rule.

The Esthetic Side of Orthodontia.

TO those who are familiar with the benefits of orthodontia it is known that the correction of malocclusion of the teeth will eliminate many evils, and that malocclusion produces a great many ills. The teeth, in normal occlusion, perform a great many functions, and the principal reason for correcting malocclusions is to place the teeth in their proper positions, so they can perform the functions of mastication. We find, however, the knowledge

of the public in regard to correction of malocclusion is often limited to the effects of malocclusion on the face. The majority of the people who seek the services of the orthodontist do so in order that the facial appearance may be improved. There probably is nothing that produces as much facial deformity as malocclusion, and it is also probable that the effects of malocclusion on the face are very poorly understood. Of course, such extreme conditions as protrusion of the upper incisors, overdevelopment of the mandibles, and underdevelopment of the mandibles, and extreme facial deformities found in mesioclusion and distoclusion are recognized by the public. Even then, however, a great many people fail to realize that the principal deformity, or cause of the deformity, lies in the malocclusion of the teeth. Dr. Henry Clay Ferris, of New York, has written several papers during the last few years dealing with the effect of malocclusion of the teeth on the beauty of the face, especially on the beauty of the face of a child. It necessarily follows, that if malocclusion produces deformity of the face of a child, there will likewise be a deformity of the face of the adult. Dr. Ferris' idea has been, however, to appeal to the parents, and have them realize that something can be done to correct the facial deformity of their children, and to have them realize also that the dental apparatus, with the surrounding muscular structures, was the principal thing to consider in the beauty of deformity of children. In the November issue of the *Oral Hygiene* magazine is an article by Lawrence G. Singleton, of Pittsburgh, entitled, "Facing Our Patients." He makes a startling statement, although true, in the following words:

"Down the avenue they are selling false faces. How many people need to buy them? There are more real live false faces on the street than artificial ones in the store. How does anybody know? Look at their teeth.

"Does not the contour of the face depend on the bony frame work, which gives support, and does not this underlying structure consist of the teeth and those parts necessary for their maintenance?

"The teeth are a part of the scheme for the individual, but for a full realization of its inheritance they must assume their typical and characteristic arch form and relations. Do you think you would be overjoyed if you knew that your child was wearing a face that did not belong to him? People are not born with false faces, but get them after they grow up. And growing up with a motley array of human teeth in the mouth puts a cartoon on your shoulders instead of your own natural face."

These quotations, taken from Dr. Singleton's article state the truth in a way that probably has never been stated before. He also impresses us with the fact that we, as orthodontists, to a certain extent have to deal with the making of the human face. It, therefore, is necessary that we become familiar with the proper proportions of the human face in such a manner that we can recognize what is best for a particular type. Dr. Angle several years ago announced the doctrine that the best balanced and best proportioned face was found where all the teeth were in normal occlusion, and it is our belief that doctrine has never been disproven. We are, however, confronted very often with conditions of malocclusion in which there is a facial deformity, and we must know enough about the development of the face and about the beauty of the face to be able to advise our patients as to what the ultimate result will be if the teeth are placed in proper occlusion, and

what the ultimate result would be if not properly treated. We very often find that certain types of malocclusion, which do not seem defective to the parent, may be producing facial deformities which are very noticeable to one who is versed in the proper development and balance of the face. We often find a type of malocclusion in which the teeth are in very good alignment, so far as the proximal position of the teeth are concerned in each arch, but there is an infraversion of the molars, permitting a great overbight in the region of the incisors, which not only produces a very unpleasing facial expression, but has a tendency to cause a great many other ills. The extraction of any of the teeth even the posterior teeth, is almost sure to produce a facial deformity, which can be easily recognized by one who is familiar with such conditions. When we remember that the teeth are supported by the maxilla and the mandible, which two bones make up the greater portion of the face, and which bones give attachment to all the muscles of expression, it is apparent that, if the maxilla and mandible are not properly developed, it will result in facial deformity. It then follows that the underdevelopment of these two bones is sure to produce some facial deformity, and that orthodontic treatment is the only procedure that will correct it. Therefore, while the esthetic phase of orthodontia is by no means the most important, it is that phase which probably appeals strongest to the majority of parents, and it becomes necessary for those practicing the science to know enough about the perfection of the face to be able to advise the patient intelligently.

Announcement.

THE editors are pleased to announce that they have procured for publication in the Journal, beginning with March, 1916, a comprehensive series of articles by Dr. B. E. Lischer, Professor of Orthodontics in Washington University, St. Louis, entitled: "FACE FACTS—A Clinical Study of Dento-facial Deformities."

The following synopsis will give some idea of the completeness and great value of these articles, not only to those practicing orthodontia, but to the dental profession as a whole:

I. Normal Variations of the Head-form.
II. Normal Variations of Dentition.
III. Normal Facial Types.
IV. Abnormal Facial Types.
V. Abnormal Dentition.
VI. Orthodontic Methods of Diagnosis.
VII. Facial Types, Pathology and Prognosis of Neutroclusion.
VIII. Facial Types, Pathology and Prognosis of Distoclusion.
IX. Facial Types, Pathology and Prognosis of Masioclusion.
X. Extreme Maxillary Malformations.
XI. Malpositions of the Mandible.

This series of papers will form an important contribution to *oral pathology*, and will be richly illustrated with over one hundred fine illustrations, most of which are new and prepared especially for this purpose.

"Apropos."

WHEN one recalls the advance made by the science to which *The International Journal of Orthodontia* exclusively devotes its pages, and the utter chaos out of which this science has been evolved, we realize that it has established itself as a highly specialized art, to be compared favorably with many of the departments of modern medicine. When practiced intelligently and efficiently, it is the most interesting and fascinating branch of dentistry, and is rapidly acquiring a relation to dentistry that surgery maintains to medicine.

Not very long since the mere straightening of crooked teeth was generally known throughout the dental profession as "regulating," which latter term, we are glad to see, is rapidly passing, if for no other reason than that in our mind somehow it is difficult to divorce this term "regulating" from an atmosphere of watches or torpid livers.

Orthodontia enjoys its present state as a result mostly of the efforts of Edward H. Angle and others, who untiring in their efforts, not only recognized the great fundamental principles which underlie the science, but also established beyond a doubt that orthodontia could be mastered or intelligently practiced only by the most thorough application and the closest attention to every detail, from the taking of the impression in a thoroughly scientific manner to the ultimate fixing and maintaining in position of normal occlusion. Anything short of this amounted to only a compromise, and should be resorted to only in the most unusual circumstances. These men devoted the best years of their lives teaching the dental profession these basic principles, and the monument of their efforts is the high state of efficiency which the science of orthodontia has attained. It has also been demonstrated that the operator who has not grasped the great principles of application and thoroughness for which the pioneers have stood is still as helpless in the correction of malocclusion as he was before they blazed the trail.

The above being a true statement of conditions, and a matter of history to those familiar with the orthodontic situation, does it not behoove each orthodontist, as well as every dentist who has given special study to this work, to maintain orthodontia on the high plane which its earnest workers have established for it, and to impress on every new practitioner entering the field of orthodontia the necessity of devoting sufficient time and study to the work to enable him to advance beyond the experimental stage. The necessity of the most thorough equipment should be emphatically pointed out. It must be borne in mind that our dental schools do not provide a course in orthodontia which enables their graduates to intelligently treat malocclusion.

Let orthodontists collectively and individually insist on better training for men who attempt to treat malocclusion, and the wire entanglements, along with the suffering of humanity, as a result of imperfect orthodontic treatment, will become antique relics, but for which at present the science of orthodontia unfortunately must still assume responsibility in the eyes of the laymen.